Perſpective made Eaſie:

OR, THE

ART

Of Repreſenting all manner of

OBJECTS

As they appear to the EYE in all

SCITUATIONS.

CONTAINING

The Elements of Deſigning and Painting.

Illuſtrated with above Fifty Figures in Copper.

Written Originally in *French*,
By *Bernard Lamy*, Prieſt of the Oratory, and Faithfully Tranſlated into *Engliſh*, by an Officer of Her Majeſties Ordnance.

LONDON:
Printed, and are to be Sold by *W. TAYLOR* at the *Ship* in *Pater-Noſter-Row*, MDCCX.

TO THE

RIGHT HONOURABLE

Sir *Henry Goodrick*, Kt. & Bar.

Lieutenant-General of the Ordnance, and one of His Majeſty's moſt Honourable Privy-Council.

And to the

HONOURABLE

John Charlton,
Chriſtopher Muſgrave,
James Lowther,
John Pulteney and
William Boulter, Eſq;

Commiſſioners of His Majeſty's Ordnance.

May it pleaſe your Honours,

SInce the Nobleſt parts of the Mathematicks are not only uſeful but neceſſary to ſuch as are concerned in an Artillery, any Branch of that Noble Science may claim your Honours Patronage, as being intruſted with the Management of ſuch a weighty Concern as the Ordnance of the

 Kingdom.

Kingdom. Your aſſiduous Application, and prudent Conduct, are ſufficient Evidences, that His Majeſty has diſcovered in your Honours, thoſe excellent Qualifications ſo proper for executing his Orders; and that he may expect an inviolable Fidelity, from ſuch as neither Pleaſure, nor Ambition, can Corrupt, or divert from the meaneſt things that concern his Service.

I am proud of the Opportunity I now have, to make a Juſt Acknowledgment of the Favours I have received, ſince I had the Honour to ſerve in the Artillery; and humbly beg your Honours Protection for this ſmall Treatiſe, which the Author's Character and my own Curioſity firſt invited me to read, and which his Plainneſs and Succinctneſs encouraged me to tranſlate into *Engliſh*. I hope your Honours will pardon my Preſumption, which I was prompted to by the Zeal I have for your Service, and the Profound Reſpect with which I am

Yours Honours

Moſt Obliged and

moſt Devoted Servant

A. F.

THE

THE PREFACE.

THE Mathematicks are ſo uſeful in all other parts of Knowledge, the Affinity of their noble Parts ſo conſiderable, and the Enquiry which hath been made after them ſo curious, that they have both contributed wonderfully to the Advancement and Perfection of Arts, and have occaſioned ſeveral ſurpriſing Diſcoveries.

" The Science of the Mathematicks (to uſe the Author's words) " is as Profitable as " it is Spacious and Difficult: It compre- " hends the Principles of all Arts; and there " is ſcarce a Science that ſtands not in need " of its aſſiſtance. Thoſe therefore who " underſtand the Mathematicks, are the beſt " qualified for all manner of Employments; " they are more capable either for practiſing " Arts, or for governing and directing thoſe " who practiſe them. Being accuſtomed to " clear Idea's and coherent Reaſonings, they " have a greater Capacity for all the Sciences,

" and are entitled to ſuch Penetration and
" Exactneſs, as renders them Ingenious in all
" Profeſſions.

" In former Times the Mathematicks
" dwelt, as 'twere, in a Sanctuary, where
" every one was not allow'd to approach:
" They were Myſteries known only to a
" few. Their Obſcurity proceeded not from
" any Artifice of thoſe who improv'd them,
" to make them ſeem more admirable, the
" Truths they contain are ſimple and clear;
" but cannot be perceiv'd without Labour
" and Attention, and a patient Study of their
" long Connexion; for ſuch a Truth, or ſuch
" a Suppoſition, can be only clear to him
" who has already unfolded a hundred others,
" of which this is the Conſequence.

" Few are capable of that painful Atten-
" tion that muſt be given to the Mathema-
" ticks, we have a general Averſion to Dili-
" gence and Application, it was therefore
" the Work of ſeveral Ages to render them
" perfect: a long Series of time was re-
" quired to invent and collect the Truths
" they contain, before they could be diſ-
" poſed in that natural order, which makes
" it eaſier now to comprehend their greateſt
" Difficulties in ſix Months, than formerly in
" ſix Years.

The

The PREFACE.

The Example of ſeveral Perſons of Piety and Judgment, who applied themſelves to render the Mathematicks more eaſie, foreſeeing what Advantages might be drawn from them, encourag'd our Author to publiſh his *Elements of Geometry*; and he would have given us a compleat courſe, if the purſuit of ſuch Studies as are proper for one of his Character had not diverted him. His Deſcription of the Temple of *Jeruſalem* was the occaſion of his recollecting what he had many Years before ſtudied of Perſpective; and the Benefit he found by it in that great Deſign, was his chief Motive for publiſhing this following Treatiſe, which ought not to be deſpiſed for its ſhortneſs, ſince the Excellency of a Book, is to be ſhort and plain. Attention is always painful, and what laſts too long cloys us. 'Tis not the enlarging on a Mathematical Demonſtration that renders it eaſier, but the doing it ſo, as that the Brevity does not ſink the Perſpicuity. Here is nothing laid down without Demonſtration; and no Rules are propoſed without proof; and it contains as much Theory as any Book of Perſpective can pretend to: It was not huddled together of a ſudden, but after its being copied ſeveral times, and paſſing through the hands of ſeveral of his Friends; he examin'd it carefully, explain'd ſome

things more clearly, turn'd others more advantageouſly, adding in ſome places, and retrenching in others, till he gave it the Form that it now bears.

The Subject is one of the moſt noble parts of the Mathematicks, 'tis a Science that conſiders the ſight, and explains by Principles of Phyſicks and Geometry, the Reaſons of the different Appearances of the ſame Object; or to give it a plainer Definition, 'tis the Art of repreſenting Objects in a Picture, ſo as they would appear if the Picture were tranſparent. From this Art of repreſenting or imitating of things ſeen with the Eye, proceeded the Art of Deſigning, and from thence the Arts of Painting, Limning, Carving, *&c.* all which, Painting eſpecially, have ſuch dependance on Perſpective, that it was the Opinion of *Pamphilus* the Maſter of *Appelles*, that without the knowledge of Arithmetick, Geometry and the Opticks, that Art could never have been brought to Perfection.

'Twas thought proper to gratifie the Engliſh World with a Tranſlation of this Excellent Piece. The Author's Character is ſufficiently known from his other Performances: And thoſe who take the pains to read this, will find 'tis not unworthy of him. I know no Book upon this Subject, in any Language, that contains ſo full and ſo plain

a Syſteme of Perſpective, as this I now publiſh: And how much we in *England* are at a loſs, for want of a Performance of this Nature, is ſufficiently known to all Lovers of Painting. I have taken care to render the Tranſlation as Juſt and Exact as poſſibly I could, chooſing rather to keep cloſe to my Author, than to purſue the Embelliſhments of Language, which things of this Nature cannot well admit of.

A

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OF THE

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AND

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Explanation of the Notes uſed in this Treatiſe.

This { + / − } signifies { *More* / *Leſs* }

This { = / : : } signifies { *Equality* / *Proportion* }

ERRATA.

PAge 10. Line 17. for *ſeen*: *'tis* read *ſeen*, *'tis*. p, 14. l. 3. for ; *theſe can repreſent* read *can repreſent*. p. 86. l. 2. for *awd* read *and*. p. 112. l. 12. for *Plan* read *Plain*. p. 124. l. 12. for *hight* read *height*. p. 141. l. 21. for *Alcomenes* read *Alcamenes*. p. 145. l. 22. and p. 146. l. 5. for *Vault* read *Arch*. p. 146. l. 1 & 2. for *Helie* read *Elijah*. p. 147. l. 13, 19, 23 & 26. for *Vault* read *Arch*. p. 148. l. 12. for *Helie* read *Elijah*. l. 13. for *her* read *him*.

A TREATISE OF Perſpective.

CHAP. I.

The Excellency of Painting; Perſpective is its Foundation.

TO repreſent upon Cloath, what is not there, as Cavities and Eminences, where all is Flat; and Diſtances when every thing is Near; is a Performance that merits Admiration. 'Tis an Effect, and at the ſame time, a Proof of what the Eye (to ſpeak Philoſophically) doth not ſee, but only the Soul which forms to it ſelf different Images of Objects, according to the different

Impreſſions of the reflected Light on the Eyes. Nothing is more difficult to be expreſſed, than the Nature of theſe Images; whither it be that the Soul forms them out of its own Subſtance, and ſo ſees it ſelf, as it were, transform'd into all things; or if it ſees theſe Images in a Subſtance above it, which being the Principle of all Beings, can repreſent all.

By this Advance, I mean only to diſcover a Difficulty, on which it would be requiſite to make ſerious Reflections; for it concerns not the Subject I intend to treat of, and therefore it's ſufficient at preſent to conſider, that the Operations of Nature being Simple and Conſtant, the like Impreſſions in the Organs of Senſe, ought to be followed with the ſame Sentiments; ſo that as often as the Eyes are ſtruck after the ſame manner, the Soul muſt have in its view the ſame Images, whatever be their Nature and Origine. If (I ſay) the Rayes, by which we ſee a Picture, pierce the Eye in the ſame order as if they came from the Objects themſelves, tho' we ſee but the Painting; and if the ſmall luminous Bodies which compoſe theſe Rayes, ſhake and move after the ſame manner the *Retina*, that is, the ſmall ſtrings of the Optick Nerve, which line the bottom of the Eye, then the Picture muſt have the ſame Effect as the Objects

jects themselves: For the Optick Nerve furnishes the bottom of the Eye with a vast number of small Filaments into which it divides it self, and makes what we call the *Retina:* 'Tis there that the Rayes do in some measure paint the Features of the Objects from which they are reflected; as when a Chamber is shut so close, that there is no passage left for the Light, but through a Perspective-glass, the Rayes paint the Objects that are without, on a piece of white Paper, if it be opposed to the Glass. This Chamber represents the Eye, and the Paper the *Retina.*

The new Philosophy supposes the World full of small Bodies, and that it is their Action or Pressure, that makes us sensible of the Light. These small Bodies, in removing themselves from that which causes their Reflection, press those that oppose their Motion, and these in like manner press those that follow, by a Communication of Motion made in a direct Line from the Object to the Eye. 'Tis this Motion (according to our Philosophers) that informs the Soul of the Figure of the Object, as the Staff does a Blind-man of the Nature of things, by the Impression it makes in his Hand, as it is thrust forward or pulled back. So the Impression of the Luminous Bodies on the *Retina,* occasions

the Soul's having the Idea of the Object, that cauſed the Impreſſion. For, we muſt know, that the Picture made by the Rayes, is only the Motion they impart to the ſmall Strings of the Optick Nerve: Now, ſince the Preſſure of the Matter which reſts on the Optick Nerve, is the Natural Cauſe of the Senſe of Light and Colours, becauſe Red appears ſtill Red, both with a ſtronger and weaker Light; we may conclude the different Celerity of Shakings or Vibrations of the Matter which preſſes the Eye, to be the only cauſe of the Variety of Colours; different Colours are in the ſame caſe as different Sounds, for the Sounds change not becauſe of the variety of the force whereby the Air is agitated in the Motion, (for inſtance) of the Strings of a Lute, but becauſe of the diverſity of Readineſs and Celerity in the Vibrations, the Parallel holds in all Points, bating that the Action of the Air conveys the Sound, and that of a Matter yet more Subtile, the Colours.

Thus 'tis the difference of the Shakings or Vibrations of the Matter which preſſeth the Eye, that adds the Colour of the Objects, to the Features of the Image, which the Rayes paint in the bottom of the Eye; that is to ſay, that 'tis the difference of the Motions that this matter takes on the Surface of the Objects,

Objects, from which it reflects it self, that causes different Sensations; or 'tis the occasion of these Sentiments that we call Colours; Just as the Soul is sensible of different Tasts, according to the Variety of the Food that affects the Fibres of the Tongue.

However it be in this New Philosophy, it is agreed upon, that a Picture, when seen from a certain Point, reflecting the Light in the same manner as the Object it self would do; ought to have the same Effect as the Object whose Features and Colours it represents. That is to say, When it sends back the Luminous Rays in the same Order and Disposition, and with those very Motions that give the true Sentiments of each Colour, the same will the Effect be. This is what's taught by that part of the Mathematicks call'd *Perspective*, which I design to treat of.

A *Picture* may be consider'd as an open Window or transparent Glass, through which the Eye which is supposed to be at a certain Point, may see the Objects represented by the Picture. Now by the help of the *Mathematicks*, the passage of the Rayes which render the Object Visible, may be trac'd in the Picture or transparent Glass. This passage being marked with suitable Colours, the Picture represents the Features of these Objects, their Form, their Colour, and in a

word, all their Appearances. And ſince it makes the ſame Impreſſion, the Soul muſt have the ſame Images in its view, and be thought to ſee the ſame things.

Mathematicians draw only Lines, they cannot finiſh a Picture; And on the other hand, Painters cannot begin it, without a regard to the Rules taught by the Mathematicians. Every *Picture* is a *Perſpective*, ſo that what is taught in this part of the *Mathematicks*, is the Foundation of *Painting*, which ought to be well adjuſted, for all Painters do not agree to it.

The Deſign of *Painting*, is to repreſent on a flat Body, as Paper, Cloath, or a Wall, whatever is deſired. This can never be done, if the view of the *Picture* makes not the ſame Impreſſion on the Eyes, as if they ſaw the things themſelves. And this is what *Perſpective* does exactly. Painters that are ignorant of this, can never ſucceed but by chance; for in Painting by the Eye in Imitation of Nature, as they do, 'tis impoſſible to form their Features ſo juſt, or range them ſo exactly in their true places, as the Rays of things ſuppoſed beyond the *Picture*, would do other Features in piercing the *Picture* if it were tranſparent.

For a clearer Conception of theſe things, Let us conſider, that there is a great diffe-

rence

rence between *Carving* and *Painting*. A Statue that ſtands by it ſelf may be ſeen on all ſides, it ſhews all its parts. As for Example, the Statue of *Hercules* in the Palace of *Farneſe*, repreſents the Body of *Hercules* intire; it may be ſeen all round, and viewed from different parts; it is not the ſame with a Painted Picture, which is terminated by a ſingle Stroke, repreſenting only and preciſely the Circumference in which the thing that is Painted appeared to the Painter that deſign'd it, and in which he deſigns it ſhall appear. So that this Circumference is different according to the different points of ſight; and cannot be proper for repreſenting the ſame Object ſeen from another ſide. This is the reaſon why all the Draughts of the *Hercules* of the Palace of *Farneſe* are not alike, becauſe this Statue was deſigned by different Perſons, who did not all behold it from the ſame ſide.

Let us here conſider, that Stones and other Inanimate Matters, can keep the ſame Situation a long time, whereas all that hath Life, is continually changing, and in a perpetual Motion. The moſt ingenious Painter cannot repreſent theſe Changes; all he can do, is to paint the Moment of an Action; that is to ſay, the Situation of every thing, the Motions, the Poſtures proper to every Actor, and the

Character of the Paſſion with which he was animated in the Moment of the repreſented Action. Nor can he thus Paint ſeveral Actions in one Picture.

In Drawing the Picture of a Perſon ſuppoſed to be alone, it ſuffices to obſerve in his Viſage, and in his Countenance, the Character of his Genius, and of his ordinary Inclinations, his Phiſiognomy, or the Strokes of his Face, which are peculiar to himſelf; but in repreſenting an Action of Conſequence, to which many contribute as Actors, or Witneſſes, every one, according to the part he undertakes, ſhould make appear by his Eyes, and by his Poſture, what he is thinking that Moment. This is the Moment a Painter can repreſent; this is the Point where all his Work tends: his niceſt Point, I ſay, is, that having placed at a certain Station, him that is to conſider his Picture, he ſees the ſame thing as if the Cloath becoming in that Moment Tranſparent, he ſaw the Action it ſelf, which is the ſubject of the Picture.

This being well conſidered, it is eaſie to eſtabliſh the Neceſſity of Mathematical *Perſpective*. It is impoſſible to ſee preciſely the ſame things, from two different Stations or Points of Sight: The Eye being placed in a certain Point, from whence it ſees at once a whole

whole Action, perceives nothing but what is oppoſite to it. If it ſee the Front of a Perſon, his Back is hid; it cannot at the ſame time ſee above and below the ſame thing. The Line which terminates what the Eye diſcovers, is ſo peculiar to what it ſees in the Situation it is in, that there would be a neceſſity of drawing a new the out-lines of a Figure, if the Eye were moved to another place; for it is evident, that the Figures of things alter, as they are ſeen ſloping, ſidewiſe, or in Front; they become likewiſe ſmaller or bigger, as they are more or leſs diſtant from the baſe of the Picture; ſo that a Picture can be only made for one ſingle Point or Station.

'Tis impoſſible to find exactly by chance, all the out-lines of a Figure, and the bigneſs ſuitable to it in the place where it is deſigned to be: This cannot be done true by Juſt and Infallible Rules, without the Mathematicks: But after all, one cannot err in theſe things without miſtaking groſly; for, once more, can a Figure be ſeen behind and before at the ſame time? What is ſeen at a diſtance, hath it the ſame Appearance as if it were near? Is it reaſonable to give a Figure almoſt the whole height of a Column, which, in the Object repreſented, is 30 or 40 Feet, when at the ſame time the Natural Heighth of this

Figure

Figure is not above 5 or 6? Theſe are nevertheleſs Faults very ordinary to Painters, particularly to thoſe who Copy the Works of ſome great Maſters, not taking notice that the Painter, whoſe Works they ſteal, hath given a Circumference to his Picture, which will not be convenient for it, in the place whither he carries it.

Many imagine *Perſpective* to be uſeful only in repreſenting Walks, Trees, or Architecture, becauſe they diſtinguiſh it only by a Concourſe of Lines to one ſingle Point. But ſince a Picture cannot have its Effect, if the Rayes, which it reflects, come not to the Eye, in the ſame order as if the Cloath let the Light paſs through, or that by the opening of the Picture, the things themſelves were ſeen: 'Tis the paſſage of the Rayes that is ſearched for in the *Painting*, as well as in the *Perſpective*, that ought not to be ſo diſtinguiſhed. To inable us to judge the better, let us ſee what *Painting* is eſſentially.

We may ſay of *Painting* as of *Eloquence*: There are general Rules for Writing and Speaking Judiciouſly and Nobly; but as being Maſter of theſe Rules, is not ſufficient for Speaking and Writing on all ſorts of Subjects, on *Philoſophy*, on the *Mathematicks*, or on *Theology*; and what Eloquence ſoever one may have, he can never ſpeak reaſonably on

a

a Subject he knows little of. So a *Painter* cannot repreſent but what he knows, tho' he ſearch to the bottom of his Art. For Example, He cannot repreſent a Battel well, if he is ignorant of the Method of Drawing up an Army; nor a Sea-fight, if he be no Seaman. But this does not imply, that a good Painter ou ht to be both Soldier and Sailer. 'Tis true, there are ſome Subjects that Painters ſo commonly treat of, that it ſeems eſſential to their Art, not to be ignorant of them. Could a Painter be Excellent, if he knew not a Man? I mean the outſide of a Humane Body, and what may appear on that outſide; the Veins, the Muſcles, and the Tendons; he ought therefore to be perfectly well acquainted with the Anatomy of the outſide of a Humane Body. Thoſe who apply themſelves to the Painting of Beaſts, ought to make the ſame Inquiry. To paint a Horſe well, 'tis convenient to know the Anatomy, and moſt eſteemed Proportion of his parts.

In fine, Painting is not eſſentially limited to repreſent any particular Subject. It is in general the Art of Imitating; and its Perfection is, that the Imitation is ſo Natural, that the Picture makes the ſame Impreſſion, as the Object it ſelf that the Painter would imitate. There lies the Beauty of his Art: 'tis the Addreſs with which he imitates what he

he would repreſent, that makes him eſteemed; for we are ſometimes charm'd to ſee that in a Picture, which would be frightful if we ſaw it really. A Serpent cauſes Fear, but its Picture, if well done, is charming: So that 'tis the Skill of the Painter that pleaſes.

Now the Imitation is not perfect, if it have not the ſame Effect as the thing it ſelf; that ſo the Eyes may be agreeably deceived. Therefore ſince a Picture can have only one point of ſight, and ſince each Figure expos'd to view, hath a certain Circumference peculiar to it ſelf, in relation to the point from whence 'tis ſuppoſed to be ſeen; and a certain bigneſs, which depends on the diſtance in which it is repreſented, we muſt of neceſſity have recourſe to the Mathematicks, without which it cannot be done to the utmoſt Preciſeneſs. It may be ſaid, there are Pictures that pleaſe without that Nicety. I own it; but whom do they pleaſe? None but ſuch as do not compare them with the things the Painter would have them repreſent. 'Tis the Reſemblance of Truth that pleaſes in Painting, as hath been ſaid. How can this Reſemblance exiſt in a Picture, when every thing confutes it, when the Ground he repreſents is too large or too ſmall for the Actions that are ſuppoſed to be done there? When what ought to be ſeparate, are hud-

dled

dled together; and what ſhould be joyned, are remote? When all is too great, or too little, and nothing hath its juſt Meaſure? Painters, after having made their Figures, do generally adorn the bottom of their Picture with a piece of Architecture, rich and fine in appearance, for if we examine the Plan in order to find, for Example, the foot of a Column, we ſhall find it reſts on the head of ſome Figure. Can ſuch Pictures pleaſe indifferently? We ſhall now examine its Perfection, and the Enquiry is neither Vain nor Uſeleſs; for the Rules of *Perſpective* are as eaſie as they are ſure.

Let us then conclude *Perſpective* and *Painting* to be the ſame thing; ſave only that *Perſpective* is made to conſiſt, in finding Geometrically, (as I do in this Treatiſe) the Points, at leaſt the *Principal*, through which the Rayes paſs, that would ſhew the Object that is painted, if the Picture were Tranſparent. I ſay, the *Principal* Points, for it would be too tedious to ſearch for all with Rule and Compaſs. The Eye alone hath an infinite Number of Features proper to it ſelf; and beſides that, two Men have not their Eyes intirely alike, the ſame Eye can change as many ways, as the Soul can have different Motions. Only they who have ſtudy'd Nature, and by a ſearch after all its Cha-

Characters, have acquired that Facility of imitating what they ſee, or what they conceive; theſe can repreſent things as they are. All a Geometrician can do, is to determine the Greatneſs and Situation of Figures in a Picture. That's what belongs to *Perſpective*, the reſt is the Work of the Painter, or of one who is wont to imitate or deſign what is ſeen; eſpecially to mark well the Outlines. 'Tis in this they exerciſe themſelves in Academies, who deſign after a Copy, or in particular, after a *Relief-work*.

A Skilful Painter having once, by the help of *Perſpective*, found the Poſition of ſome Points in the Circumference, which he endeavours to compaſs, finiſhes it eaſily; which is impoſſible to thoſe that cannot deſign. There are a thouſand fine Strokes, on which one may find ſeveral Points, and yet not be able to finiſh them. Every Motion hath a proper Poſture; every Paſſion hath a Character in the Viſage; every Age, every Sex, and every Condition, a certain Air which he muſt be a Judge of, and know how to expreſs; otherwiſe, what is done repreſents nothing that hath Life, all is dead for the Air and Features of a Body full of Life, are very different from theſe of a dead Body. However it may reſemble ſomething that had once Life, there are ſtill the ſame Features

Features but much changed. Nothing but a long Exerciſe, and an extraordinary Genius, a Curiosity and a Nicety more than ordinary, can make one ſenſible of the difference.

Let us add, that tho' the Art of Painting conſiſts in Imitating, yet a Painter that can only Imitate what he ſees, is no Artiſt. What he repreſents ſhould be Beautiful and Fine, and there is no Beauty but what is Imperfect. He muſt therefore imagine what is not, and form a Reſemblance finer than the fineſt things can be found; for when he forms to himſelf an Idea, it may happen that nothing can be found intirely reſembliug it. He ought therefore to dive into what things may happen, in all the Conditions in which they can be apprehended. To repreſent the Poſture of a Body that one ſees before him, 'tis not requiſite to be an Anatomiſt; but without the Knowledge of Anatomy, 'tis impoſſible to repreſent correctly a Poſture, which he conceives but does not ſee.

The *Science* of a *Painter* ought to be infinite, if he undertakes to meddle with all Subjects; but he undertakes a large Task, when he confines himſelf to Man; that alone is ſufficient to imploy him. He cannot Paint all the Interior Motions that are hid from him; but ſince theſe Motions have their Signs

Signs on the Viſage, he may ſtill repreſen
them. Thoſe who have writ of Painting
have done this at large: They have examine
the Proportions of a Humane Body, as t
Age and Sex, and as to the Condition t
which Nature renders them moſt proper
For it is evident that there is a certain Diſpo
ſition of Body neceſſary to make a Wreſtle
which is not always found amongſt thoſ
that are proper for Government; ſo that w
muſt judge of a good Proportion, with rela
tion to the Quality of the Subject.

This Search after ſuitable Proportions, wa
the Study of the great Maſters of Antiquity
A ſingle Statue, or the Painting one Figur
in a Picture, imployed a part of their Lives
They were not ſatisfied to imitate only wha
they ſaw; if they painted a *Wreſtler*, the
formed the moſt noble and perfect Idea tha
was poſſible, of a robuſt well-made Body
To this end they conſidered all the *Wreſtler*
meaſured them exactly, and taking from
each what appeared to be perfecteſt, in r
lation to their Deſign, they formed that pe
fect Idea of an Agile, Robuſt, and Well-pr
portioned Body. If they made a Statue,
Picture, of *Venus*, that is to ſay, of a fi
Woman, they made the like Search on a
Bodies, where they perceived the Features
a rare Beauty.

Gi

Since I ſpeak of *Painting* more as a Mathematician than as a Painter, 'tis not my buſineſs to advertiſe *Painters of Hiſtory*, that they ought (as Poets in a Comedy) to be careful of the Unity of Action, Time and Place, and for that reaſon to paint but one Action in one Picture, with what relates to it, and is neceſſary to denote it. A multitude of Perſons cauſes Confuſion, this may be avoided by making none appear but who are neceſſary towards the execution of that Action, in their convenient Poſtures: All ought to be attentive Witneſſes, and ſhew in their Countenances the Motions with which they may and ought to be animated, in relation to their State, Sex, Age, Quality, and to their part in the Action, which is the ſubject of the Picture. Above all things, Likelihood and Decency muſt be obſerved; Painters have much leſs liberty than Poets, for a Poet may allow 24 hours to the Action he repreſents, but a Painter can only repreſent the Inſtant of an Action, and what is ſeen at one ſingle look. This would need a more ample Explanation, if I deſigned a compleat Treatiſe of *Painting*; I ſpeak but as a Mathematician, and therefore cannot treat of Colours, of the matter of which they are compoſed, nor of the manner of mixing them, ſo as to imitate the natural Colour of the Objects to be painted. There

are Secrets for preſerving Paintings always clear and lively. Colouring is a conſiderable part of *Painting*. The Mathematicks make Abſtraction of the ſenſible Qualities. *Perſpective* then, which is but a part, can be no other than an Application of *Geometry*, to find the paſſage of the Luminous Rayes, that will make the things themſelves appear, which are ſuppoſed to be behind the Picture, and are to be there repreſented. *Perſpective*, I ſay, is the Foundation of *Painting*, but it is not ſufficient to make an accompliſh'd Painter, I am far from pretending it: The Idea which I have given of *Painting*, ſhews that I have other thoughts; but after all, what I have ſaid, will ſerve to prove, that *Perſpective* is uſeful to a Painter, that 'tis that which regulates his Deſigns; that without it he works but at random, and cannot keep up to the nicety of juſt Meaſures. In the firſt place, we will ſee which are the Terms uſed in *Perſpective*, and which are its Principles.

CHAP.

CHAP. II.

An Explication of the usual Terms, and the Principles supposed in Perspective.

Definitions or Explications of the Terms peculiar to Perspective.

DEFINITION I.

A Geometrical Plan, is that on which the Spectator, and the Objects he considers, are supposed to be, and on which the Picture is raised, in which the Objects are to be represented.

THE Square X is the *Picture* or *Perspective Plan*, and Z is the *Geometrical*. What we here term a *Geometrical Plan*, is sometimes called the *Pavement* or *Ground*. (*See Plate* 1. *Figure* 1.)

The *Geometrical Plan* is generally supposed to be parallel to the *Horizon*, therefore the Line in the Picture, that's parallel to the *Geometrical Plan*, as G H, is called the *Horizontal Line*.

The *Picture*, or *Perspective Plan*, may be either Perpendicular, or inclining on the *Geo-*

metrical Plan; or it may be parallel to it, when compared with the Spectator, it is ſaid to be direct or ſloping, as it is ſeen in front or ſidewiſe. In fine, it may be placed above or below the Eye; in all theſe Situations 'tis ſtill between the Eye and the viſible Object. Its ordinary Situation, is to be perpendicular on the *Geometrical Plan*, and direct in reſpect of the Eye; and in this Situation we ſuppoſe it to be, when no other is mentioned.

DEF. II.

The height of the Eye, above the Geometrical Plan, is the Perpendicular which meaſures that height.

This Line is likewiſe called the *Line of Station*; ſo B repreſenting the Eye, the Line B D is the Line of Station. Some Authors give this name to the Line D K, of which elſewhere.

DEF. III.

The Principal Ray is a ſtraight Line drawn from the Eye, perpendicular to the Plan of the Picture when it is upright, as is here ſuppoſed, and the Point where it falls, is called the Principal Point, or Point of Sight.

A B is the *Principal Ray*, and A the *Point of Sight*. It is the *Principal Ray* that meaſures the

the distance of the Eye from the *Picture*. The *Principal Point* is called sometimes the *Center of the Picture*, and Point of *Concurrence*, because several Lines meet there, as we shall see, and cut one another if they were prolong'd, as the Semidiameters of a Circle in the Center, wherefore these Lines are in such a case called *Radial*. Some Lines there be, that seem to flee and lose themselves, and are therefore called *Fleeing Lines*.

DEF. IV.

The Horizontal Line, is that which passes through the Principal Point A, *and is parallel to the Ground Line* G H.

Imagine a *Horizontal Plan* passing by the Eye, and cutting the *Picture*, the Section of this *Plan*, with that of the *Picture*, is what we call the *Horizontal Line*.

Let A C be the Section of the *Picture*, and of a *Plan Vertical*, or perpendicular on the *Geometrical Plan*, and passing by the Eye of the *Spectator*, and D K the Section of the *Vertical* and *Geometrical Plan* Z, it is the Proportion that Objects have with those two Lines, that determines their Situation on the *Geometrical Plan*. Some call the Line D K the *Line of Station*, as we have said before.

The Line B D the height of the Eye, which we have called the *Line of Station*, and the Line B I, which is the *Principal Ray*, prolong'd, are both in the *Vertical Plan*.

DEF. V.

The Accidental Point is a Point in the Horizontal Line, where Lines parallel amongſt themſelves tho' not perpendicular to the Picture, do meet.

We ſhall demonſtrate, that the *Perſpective* of Lines which are perpendicular to the *Picture*, meet in the Principal Point; and that the *Perſpective* of thoſe that are parallel amongſt themſelves, but not perpendicular to the *Picture*, meet in another Point likewiſe in the *Horizontal Line*. This Point is called *Accidental*, to diſtinguiſh it from the *Principal Point*, which hath a determined place; the other hath no fixed place, becauſe of the different Situation of the Lines, whoſe *Perſpectives* meet in this Point. It is called *Accidental*, becauſe the ordinary Situation of a *Picture*, is when the parallel Lines cut it, at Right Angles; ſo that their *Perſpectives* concur in the *Principal Point*.

Plate 1st

Page

Fig: 1st.

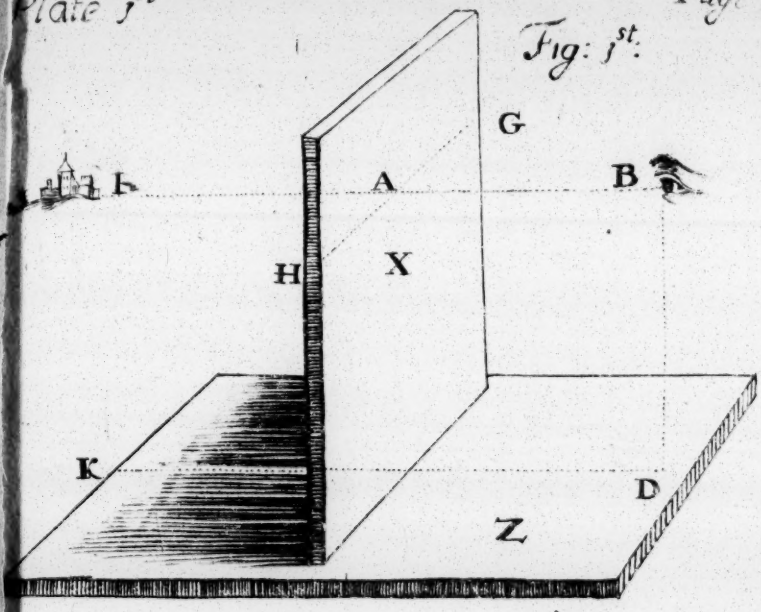
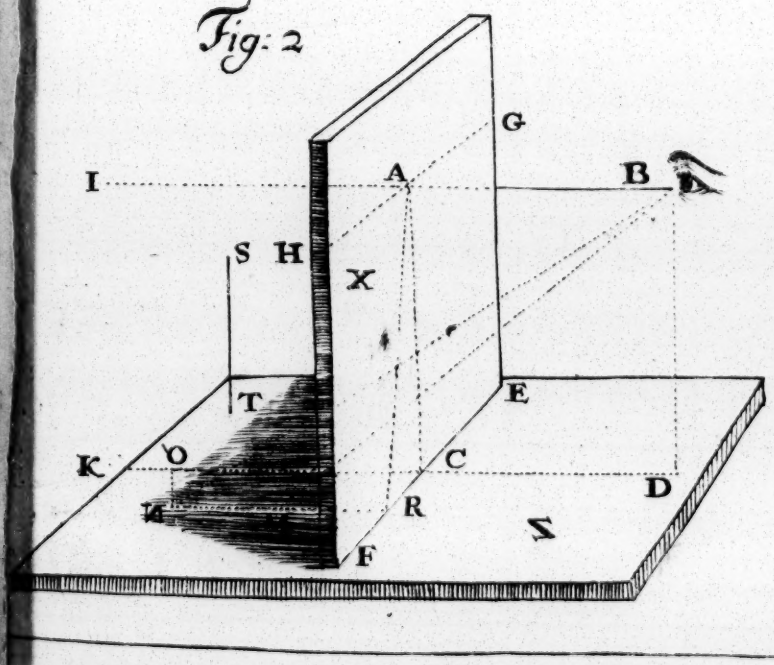


Fig: 2



DEF. VI.

The Base of the Picture, or the Line E F, *which is the common Section of the Picture and the Geometrical Plan, is called the Ground Line.*

Those that will not use this Term, call this Line no otherwise but the *Base of the Picture.*

DEF. VII.

N *being the visible Object, and* N R *the distance of the Picture, the Point* R *on which* N R *falls, is called the Point of Incidence.*

The Situation of an Object on the *Geometrical Plan,* depends on its distance from the *Picture,* and from the *Vertical Line:* So it is the Lines N O and N R, that determine this Situation. Some call the Line N R the *Longitude,* and N O the *Latitude* of N.

DEF. VIII.

The Seat of the Objects, is the perpendicular Support that each of its parts hath on the Geometrical Plan.

So the Perpendicular S T is the *Seat* of the Object S.

DEF. IX.

The Points of distance of the Eye from the Picture, are two Points in the Horizontal Line, equally distant on each side from the Point of sight, by the length of the Principal Ray.

To find the Perspective of a Point, mark on the Horizontal Line, on both sides the *Principal Point*, the distance from the Eye to the *Picture*.

Mark, likewise, on the Ground Line, or on a Line parallel to it, the distance from the *Picture* to the Object that is to be put in Perspective, by two Points equally distant, from a third where falls a Perpendicular. This will be easily comprehended when we come to the Practice.

An EXPLICATION of some Terms not belonging to Perspective, yet often used in speaking of this Science.

As *Perspective* is often used in representing Works of *Architecture*, so the Terms of *Ichnography*, *Orthography*, *Elevation* and *Profile* (which are proper only to *Architects*) are sometimes used. The first is a Greek word, and signifies properly the Figure or Print which

which the ſole of the Foot leaves on the Ground, which the *Greeks* call *Ichnos*. Amongſt Architects it is the Section of a Building cut Horizontally near the Ground. 'Tis likewiſe what we call a Plan. So the Plan or *Ichnography* of a Church, is the mark left by this Church, if it had been raz'd; or the firſt appearance in Building, when the Foundation is ready to appear above Ground. The *Ichnography* of a Cube, or Gaming Dye, is a Square; and that of a right Cilinder is a Circle.

In the Terms of *Perſpective*, *Projection* is a certain view according to the Situation of Bodies, whoſe Deſcription is drawing on a Plan ſuch as they would appear, if the Eye were in a certain Point.

Orthography or *Elevation*, is the repreſentation of a Building, as to its breadth, thickneſs, heighths and depths; generally it is all can be ſeen at a ſingle view, ſuppoſing the Eye infinitely diſtant, or greater than the Object. *Orthography* is marked with perpendicular Lines, repreſenting the Heights of an Edifice. This is what's underſtood by the word *Orthos*, which ſignifies *Right*.

Orthography or *Elevation*, is ſometimes confounded with the *Profile*. *Profile* is an *Elevation*, but this word implies particularly the Cut of a Building, which ſhews the inſides and

and outſides that are behind the Plan, which makes the Cut; and at the ſame time all that is cut by the Plan, as the thickneſs of Walls, Timbers, and all other Objects ſo cut, the Eye being ſtill ſuppoſed infinitely diſtant. X is the *Elevation* or *Orthography* of part of a *Pilaſter* with its *Corniſh*; and Z is the *Profile* or *Cut* of the ſame part, which ſhews the thickneſs and heighth of its parts. It is particularly the Line which makes this Cut or Section that's called the *Profile*. *Schenography* is likewiſe the ſame thing with *Orthography*, 'tis the repreſentation of an Object elevated on the Geometrical Plan, with its ſhadows as it appears to the Eye. (*See Plate* 2. *Figure* 1 & 2.)

Artificers call *Geometrical* whatever keeps its proper Meaſures, but Figures put in *Perſpective*, and ſeen from a certain determined diſtance, change, and have no more the ſame Meaſures. In the Perſpective of a long Gallery, the laſt Squares are the narroweſt, and the Columns ſmalleſt and ſhorteſt; ſo they diſtinguiſh betwixt what is *Perſpective*, and what is *Geometrical*, or betwixt a Perſpective and Geometrical Repreſentation. As for Example (ſee *Plate* 3. *Figure* 1, 2.) the ſame Column repreſented two ways, X *Geometrically*, and Z in *Perſpective*. You ſee that A the *Geometrical Ichnography*, keeps both its

Meaſures

Fig: 1

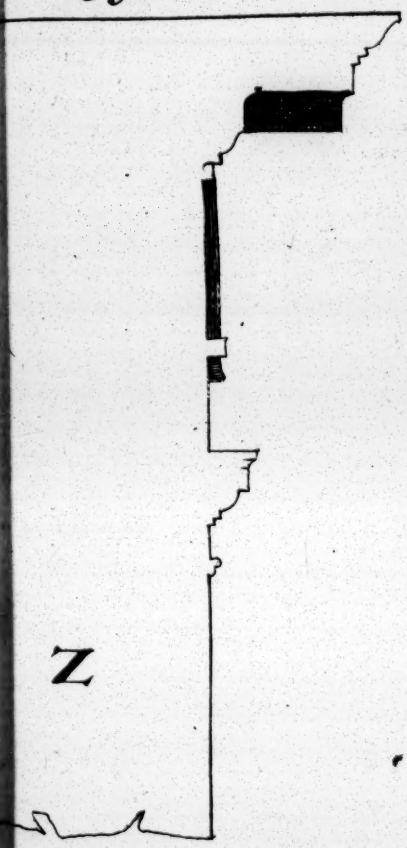
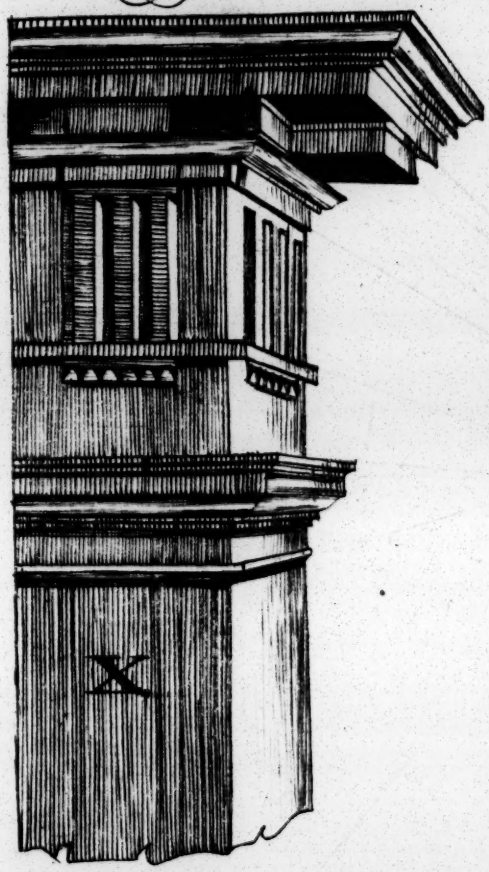


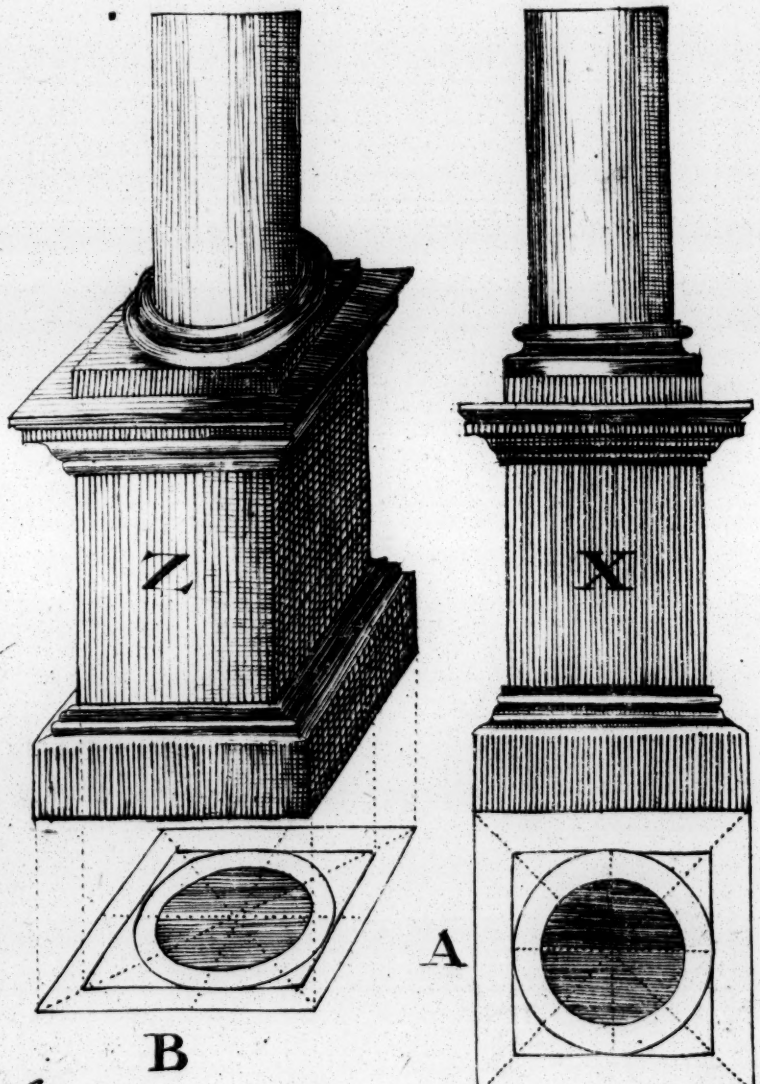
Fig: 2



The PROFILE and ORTHOGRAPHIE of the Cornish and Capitall of a PILASTER

A Perspective of of the foot of a Co:lumn and Mould:ings.

A Geometricall View of the same Column



A Perspective Plan of the base of Z

A Plan Geometricall of the base of X

Meaſures and Figure; all which is changed in the *Perſpective Ignography* B. What is *Geometrical*, may be likewiſe conſidered as *Perſpective*, ſuppoſing the Eye infinitely diſtant; for a Front that hath many Pillars, being ſeen at an infinite diſtance, it appears as if the Eye were exactly oppoſite to each of theſe Columns: When the diſtance is determined, we ſee ſeveral Lines tending to a ſingle Point; the equal parts, but more diſtant, become leſs, and ſhew different ſides, according as they are ſituated in regard of the Eye. This happens not when the Eye is infinitely diſtant, for the different ſituation of the parts of the Object, in reſpect to the infinite diſtance, cannot be perceived; it is as if the Eye were oppoſite to all, and all were equally diſtant from it.

Thoſe who repreſent Fortifications, do it generally *Geometrically*, which is eaſieſt. *M. Ozanam* calls this *Military* or *Noble Perſpective*. The *Geometrical Plan* it ſelf, on which is deſcribed the Seat of the Objects, without any change, is taken for the Picture; which is the reaſon that the Seat or *Ichnography* of all pieces of Fortification, that are to be elevated, does not change, but continues always the ſame. The Heights continue likewiſe the ſame; whereas in ordinary Pictures it is neceſſary to change the *Ichnography* in a *Perſpective Plan*, and

and to change likewiſe its heights in diminiſhing them proportionably, as they repreſent heights more diſtant from the Picture. Architects, Ingeneers and Artificers, who deſign their Works before they put them in execution, repreſent them *Geometrically*; they make little uſe of *Perſpective*, but for general Views, and when they would ſhew different Faces of the ſame thing.

Suppoſitions or Poſtulata.

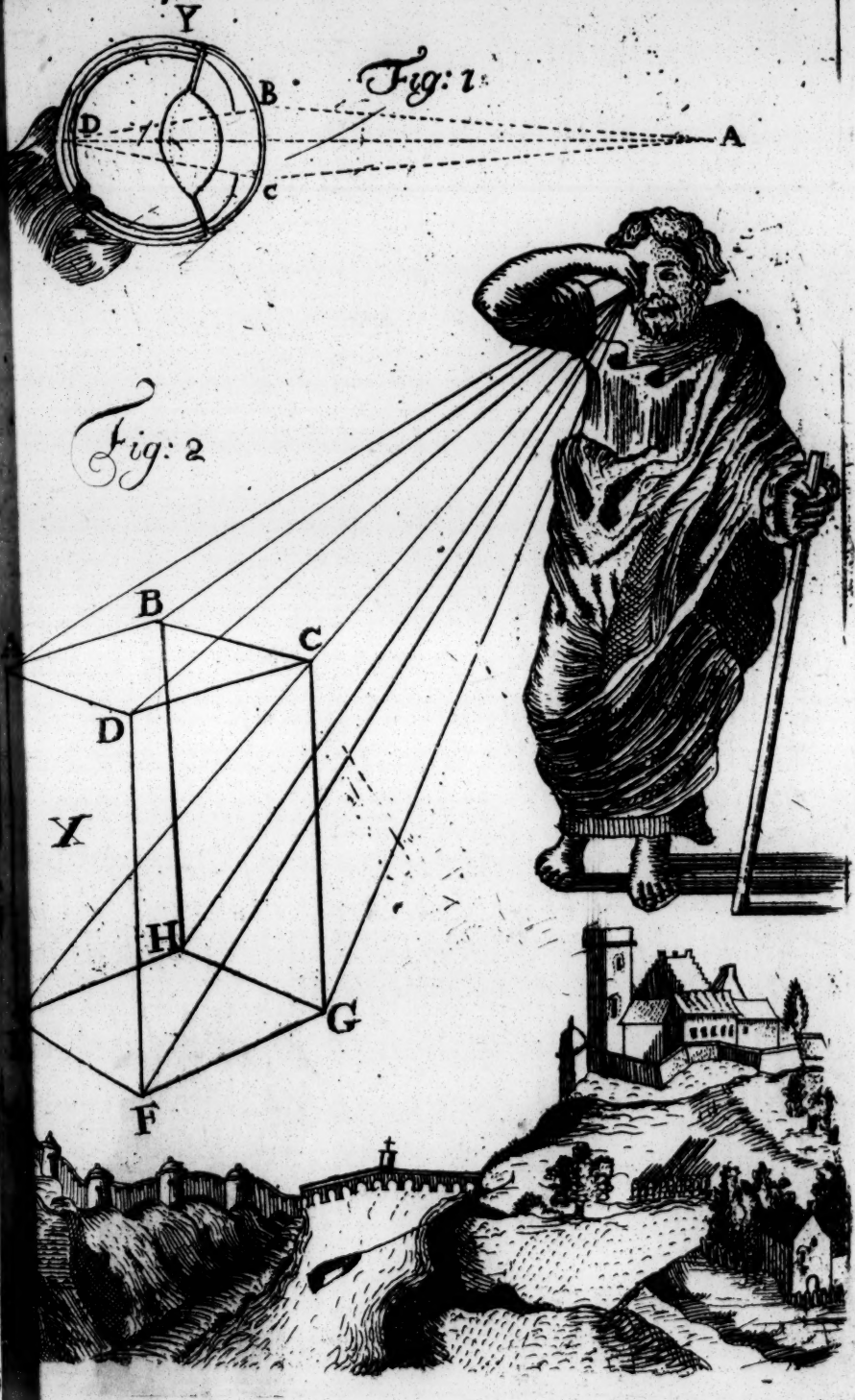
SUPPOSITION I.

The Eye is a Point, and every Ray is a ſtraight Line.

This Suppoſition, taken in a ſtrict Senſe, is falſe, for the Eye Y *(Plate* 4. *Fig.* 1.) hath an opening B C of a conſiderable bigneſs, where from each Point of an Object, there enters ſeveral Rayes into the Eye, which make a Pyramid B A C, of which the viſible point A is the top, and B C, the overture of the Eye, is the baſe. The ſame Rayes reuniting in the bottom of the Eye, at the point D, make an oppoſite Pyramid, which hath the ſame baſe B C, ſo that there are two Pyramids, an *Exterior* and an *Interior*:

This

Plate 4.



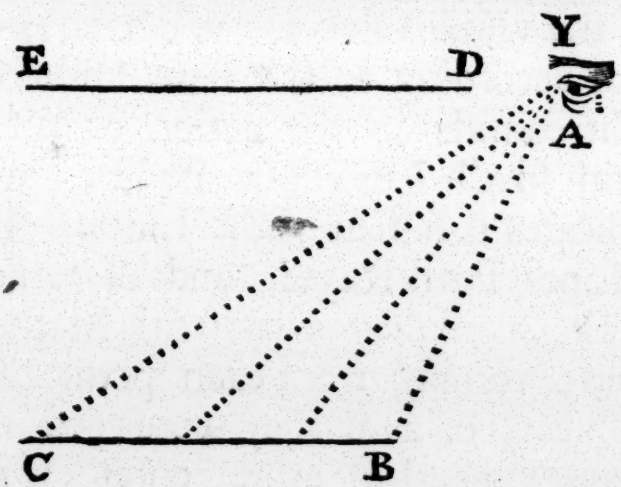
This is agreed to, and Experience does not allow it to be doubted of. Now tho' there enters ſeveral Rayes into the Eye, reflected from the ſame Point of the viſible Object, the ſame happens as if the Eye were the Point D, and the Object A were only ſeen by a right Line A D, therefore our Suppoſition may be allowed of.

To demonſtrate how the Rayes may be conſidered as right Lines, I have cauſed to be ingraven the Figure of a Man, gathering and uniting in a Point at the entry of his Eye, ſeveral ſmall Strings which come from the Angles of a Solid, (ſee *Plate* 4. *Fig.* 2.) Theſe ſtrings repreſent the Rayes which ſhew each point of the viſible Object. We have already ſaid, that according to the new Philoſophy, the Light conſiſts in the action or preſſure of certain ſmall Luminous Bodies, which communicates it ſelf in right Lines. Theſe are the Lines I call Rayes, and of which I ſhall ſpeak, as if they were real Mathematical Lines, coming from each point of the viſible Object; or as if they were tyed in the ſame manner as the Figure repreſents theſe ſmall ſtrings.

SUPP. II.

The Rayes by which we perceive a Line, make a Plan, if this Line prolong'd enter not the Eye.

Suppoſe a ſtraight Line, ſuch as D E, if it were placed in regard of the Eye Y, ſo as that being prolonged it would enter it, 'tis evident the Eye can ſee but one of its Extremities, to wit, D, which is the neareſt, and ſo it would only ſee it by a ſingle Ray; but in any other ſituation, as in the Line B C, there comes to the Eye Y ſeveral Rayes,



which are right Lines. By the firſt Suppoſition, theſe Rayes make a Plan A B C, according to the Notion we have of a Plan.

Third

SUPP. III.

The Point in the Picture where the Ray passes, that comes from the visible Point, is the Perspective of that Point.

So P is the Perspective or Representation of N, according to the Notion we have given of *Perspective*, at the beginning of this Chapter, (*Plate* 5. *Fig.* 1.)

SUPP. IV.

If the visible Point touch the Picture or Perspective Plan, the Perspective of that Point is where it touches the Picture.

This is evident.

SUPP. V.

The Perspective of a right Line, which being continued, passes not through the Eye, is the Section of the Picture, and the Plan which is composed of the Rayes which come from that Line.

So the Eye B, perceiving the Line M N, by several Rayes, which make the Plan B M N, the Line P Q, Section of that Plan B M N,

BMN, with the Picture X, is the Perſpective of M. N. (ſee *Plate* 5. *Fig.* 1.)

SUPP. VI.

The Perſpective of the Surface of an Object, is that part of the Perſpective Plan, or Plan of the Picture, comprehended between the Perſpectives of the Lines which bound this Surface.

This is evident.

Before we end this ſecond Chapter, 'twill be proper to make ſome farther Reflections on the Action of the Light; whereby we ſhall diſcover important Rules in Perſpective, and likewiſe the cauſe of theſe Rules. The Light (as we have ſaid) conſiſting in the Action of certain ſmall Bodies that preſs the Eye, and this Action not having an infinite force, both Reaſon and Experience ſhew that a diſtant Object ſhould ſtrike the Eye more faintly; ſo that it is partly by the livelineſs of the Action of the Light, that we judge of the diſtance or greatneſs of an Object; if its diſtance be conſiderable, we ought to judge it nearer to us than it is.

This is the reaſon that a Surface, whether *Concave* or *Convex*, appears flat and united if ſeen from afar; for let the *Concave* Line

be A C D E B, (ſee *Plate* 5. *Fig.* 2.) and the *Convex* A F G H B, it is evident, that if theſe Lines be removed far from the Eye, all the various Rayes which ſhew the ſeveral parts of theſe Lines, do not work differently on the Eyes; or the difference of the Action of the longeſt Rayes, makes not an impreſſion ſenſibly greater, than that of the action which ſhews the parts neareſt the Eye. So that there being no ſenſible difference in the action of theſe Rayes, they appear the ſame to us, as if they came all from the right Line A B. The Sun and Moon, tho' Spherical Bodies, appear flat to us. That which is rugged, at a diſtance appears ſmooth; and for the ſame reaſon, what is ſquare may appear round, when diſtance takes away the appearance of its Angles.

For the ſame cauſe, the *Pavement* of a long Gallery, appears higher at the Extremity, and the *Ceiling* lower. The true reaſon is this, Let the right Line A B repreſent the *Ceiling*, and D E the *Pavement* (ſee *Plate* 5. *Fig.* 3.) the Eye is at the point X. The Rayes of the remoteſt parts, ſtrike not the Eye in a ſenſibly different manner, we judge therefore this Ray ſhorter, and conſequently the part from whence it is reflected appears nearer; ſo the Line A B hath the ſame appearance as A C, and D E as B F. That

which is then in E, appears at the point F, and therefore higher than it is; as that which is in B, appears in C, and conſequently lower.

The Figure ſhews likewiſe, that the equal parts A B and D E, ought to appear unequal; and that the moſt diſtant have the leaſt appearance: Becauſe the Rayes of the fartheſt objects preſſing the Eye leſs, it judges not the object to be in the place where it is; B G appears H C, and therefore leſs than it is. It is the ſame with E L, which appears as F K, ſo that at a diſtance equal parts appear unequal, and the fartheſt appear the ſmalleſt.

This is what Painters cannot be ignorant of. therefore in Painting of things, as they ſee them, they never fail to repreſent the moſt rugged bodies ſmooth and even, and all their parts confuſed, if they ſuppoſe the Eye at a great diſtance. They notice nothing diſtinctly in repreſenting a very remote Figure. They raiſe whatever is below the Eye, according to the diſtance, and decline all that is above it. They repreſent, I ſay, all that is remote, leſs than Nature. This is what they call *Degradation* of a Picture.

We have ſhewn, that it is the manner after which the Luminous Bodies ſtrike the Optick Nerve, that makes the different Sentiments of Colour; ſo that as the action of theſe

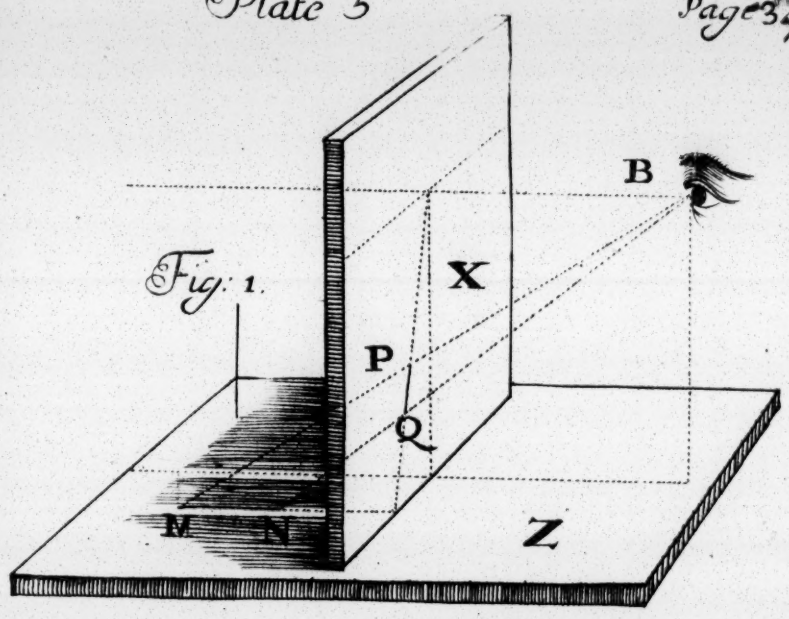


Fig: 1.

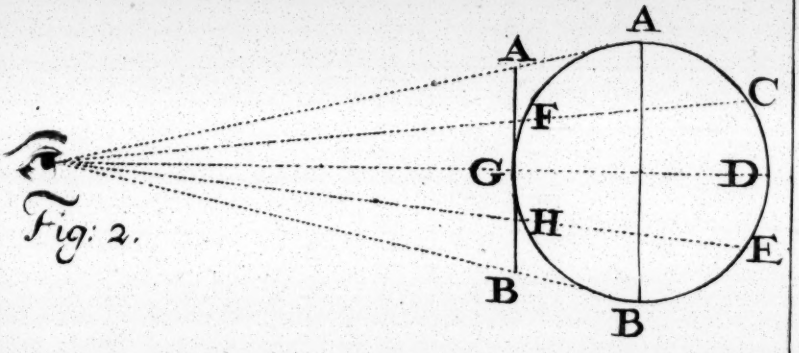


Fig: 2.

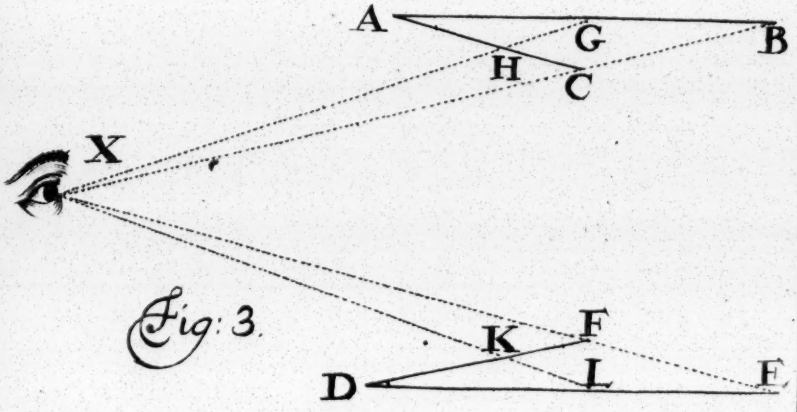


Fig: 3.

theſe bodies, keeps not it ſelf all entire, when they remove from the bodies from whence they are reflected, ſo they ought not to appear ſo lively coloured as if the Eye were near. Remote bodies appear without colour; therefore they ought to have none in a Picture, or at leaſt it ought to be weakened; and in adjuſting this faintneſs, lyes the Myſtery of *Painting*; for tho' an object be coloured with the ſame colour, as to its kind, yet its parts are diſtinguiſh'd by the faintneſs or fullneſs of the ſame colour, according to their ſituation, as we ſhall ſhew more particularly in the laſt Chapter of this Treatiſe. Painters call this Diminution of the Tincture or Colours, *Aerial Perſpective*; and the Diminution of Lines which repreſent others remote from the *Picture*, they call *Lineal Perſpective*. It is this only I have undertaken to treat of. Nevertheleſs I ſhall have occaſion to reduce *Aerial Perſpective* in ſome meaſure under this Head, and touch lightly upon it.

Many advance for an Axiom, a Propoſition which on ſeveral occaſions is falſe, and capable of cauſing us to commit great Miſtakes in the Practice of *Perſpective*. They pretend, that things ſeen under equal Angles, have the ſame appearances, or appear of an equal ſize; from whence Father *Tacquet* concludes, that if a Statue, or right Line, appearing equal

to B C, (ſee *Plate 6. Fig.* 1.) were erected on the Column B D, then a Line drawn from D to A, and the Arch *e f* taken equal to *b d*, the line A E drawn through *f*, would give the line D E, which in appearance would be equal to B C, becauſe ſeen under an equal Angle.

This Propoſition holds not always true, it holds when the objects are near; but at a diſtance things of the ſame bigneſs have different appearances according to the variety of the Eſtimate we make of their diſtance. For ſince we ſee in a right Line, objects ſeen under the ſame Angle muſt appear ſo much greater, as they are judged to be diſtant. We may be ſaid to have within us, a kind of Natural *Trigonometry*; for when we view an object, there is a Triangle form'd by the Rayes of that object, and the diſtance of our Eyes; which being known with the two Angles of the ſituation of the Eyes, determines the ſenſation of the remoteneſs of the object. But the Interval of our Eyes is too ſmall a baſe, to judge of the diſtance of remote bodies; becauſe the Eyes change not ſenſibly their ſituation, to ſee an object at a thouſand Paces, or to ſee it at 100000. Wherefore we cannot judge of the diſtance of objects by Natural *Trigonometry*, but by the apparent bigneſs of interpoſed bodies.

There

Therefore the Sun and Moon appear much less, and nearer to us, when we see them above our Heads, than when we see them on the edge of the Horizon. I shall add nothing more here, referring the Reader to what Father *Malbranche* hath said in his *Search after Truth.*

To demonstrate the falsehood of this Proposition, which Father *Tacquet* takes for an Axiom, That what is seen under the same Angle, appears equal. Suppose the Eye to be in A (see *Plate 6. Fig.* 1.) and a Statue to be erected on the Column B D, that according to him should appear equal to B D. If the Angle *b* A *d* were of 45 deg. it behooved, according to the pretended Axiom, that the Angle D A E were equal to the Angle *b* A *d*, to the end that D E might have the same appearance as D B; but 'tis not possible, in this case, that these Angles can be equal, tho' D E were prolong'd *ad infinitum*; for A *g* being supposed parallel to B E, the Angle D A E must be always less than the Angle B A D, which is supposed of 45 degrees. But allowing it to differ a little, even then D E would be almost infinite. Nevertheless, according to this Axiom, it should appear less than B D, which is contrary to experience. We shall see in the sequel, what may be done in placing an object in a high place,

and preſerving the appearance of its natural bigneſs.

Before we finiſh this Chapter, we muſt examine a Difficulty that ſome make againſt this Suppoſition; That the place from whence the Picture ought to be ſeen, is but a Mathematical Point. They are deceived, ſay they, who conſider the viſual Point as a real Point; becauſe the two Eyes that ſee, are not one Point. What ſhall we anſwer to this Difficulty? Why, in the firſt place, thoſe that examine a Picture nicely, uſe but one Eye. In the ſecond place, The ſmall Interval that is betwixt the two Eyes, may be taken for a ſingle Point, in reſpect to the remoteneſs at which the Picture ought to be ſeen.

Others anſwer, That they ſee but with one Eye; That the two Eyes act only alternatively; That one alone ſees; and that ſo the Ocular Point, or place from whence the Picture is ſeen, may be ſuppoſed a ſingle Point. They go upon Experiments, which if tryed, ſhew the quite contrary. For let X be a black Ball, (ſee *Plate 6. Fig.* 2.) and Z a white Table, if the Eye B be ſhut, and the Eye A uſed, it ſhall ſee X in D, as B will ſee it in C, if it look to X alone; now the two Eyes A and B being open, they ſee X in E; which I have tryed ſeveral times.

Fig: 1st

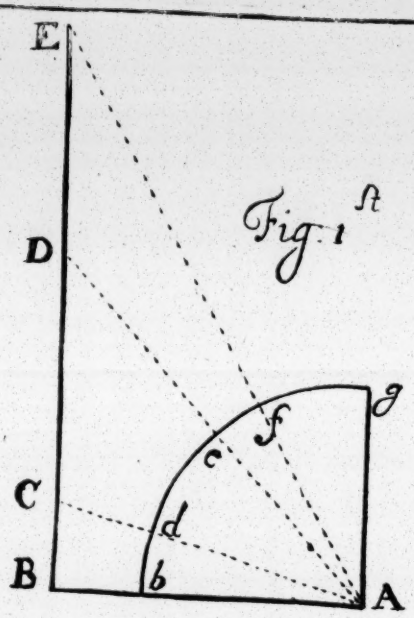
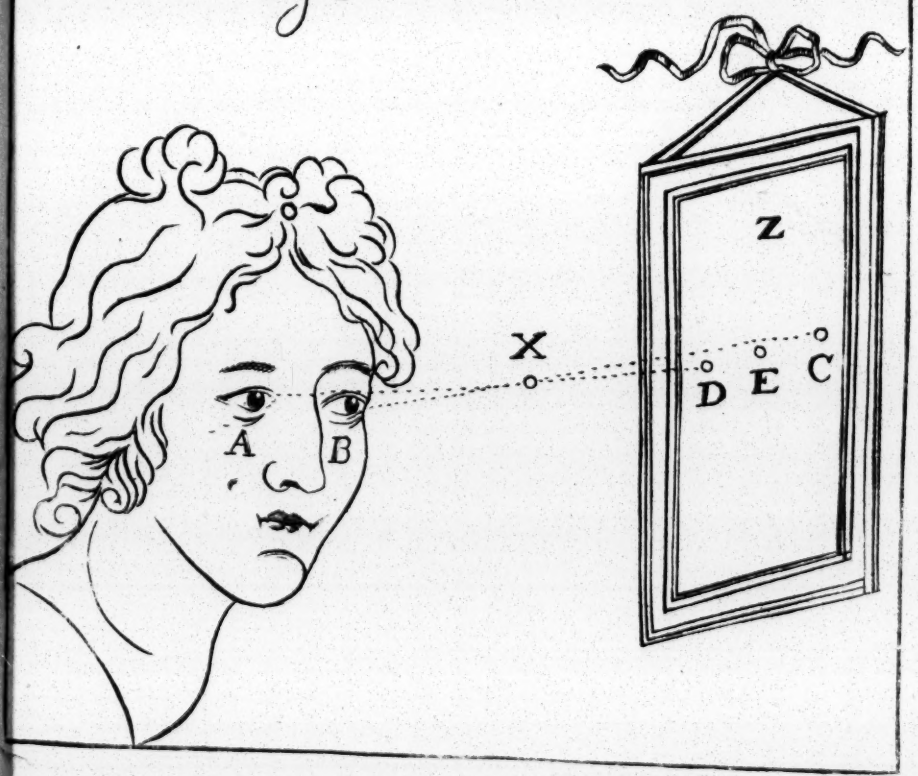


Plate: 6

Fig: 2



It is not then true, that one Eye only acts; or that we ſee only with one. But as I have ſaid, this hinders not, but that we may ſuppoſe, the Point of ſight, to be truly a ſingle Point; that is to ſay, that the two Eyes of him who is in a place, from whence the Painter would have him conſider his Picture, may be taken for a ſingle Point. A Picture ſeen too near, hath not the Effects it ought to have; and at a diſtance, the Interval of the two Eyes is as nothing in reſpect of the Picture; as experience ſhews, in what we have been ſaying; for if the Ball X be at a great diſtance from the Eyes, and near the body Z, which ever Eye is ſhut, or kept open, whither the object be beheld with one or both Eyes, the right or the left, X ſhall ſtill be ſeen in the ſame point of the Table Z, without any ſenſible difference.

CHAP. III.

Of the Properties of the Section of two or more Plans, which meet or cut one another.

PErſpectives are the Sections made by the Plan, of the viſual Rayes with the Picture; conſequently it is neceſſary to call to mind the Properties of Sections of Plans. I ſhall here propoſe theſe Properties, but I ſhall not meddle with the Demonſtrations, becauſe they are to be found in the firſt Section of the fifth Book of the *Elements of Geometry*, which I have publiſh'd. I cite the Propoſitions of that Book, and thoſe of *Euclide*, where theſe Demonſtrations are; but it is not neceſſary to have recourſe to them, for the inſpection of the Figures is ſufficient to demonſtrate theſe Propoſitions, ſo as to be perſwaded of them.

PROPOSITION I.

A Right Line cannot be partly in the Air, and partly in a Plan.

This Propoſition is the ſixth of the fifth Section of my *Elements of Geometry*, and the firſt of the eleventh Book of *Euclide*.

COROL-

COROLLARY.

A Right Line piercing a Plan, cuts it but in one point.

For if it cut it in two points, it must be all in the Plan; otherwise part of it must be in the Plan, and part of it in the Air, which is contrary to the first Proposition.

PROP. II.

All Triangles may be imagined in a Plan.

This is the 8th Prop. of the forecited Section.

PROP. III.

The common Section of two Plans, is a Right Line.

This is the 14th Prop. of the 11th Book of *Euclide*, and the 9th in the forecited Section.

PROP. IV.

When two Plans, Z *and* X, *cut one another; if the Line,* E D *perpendicular on* A B *the Section of* Z *and* X, *be perpendicular on* X, *all the Plan* Z *is perpendicular on* X.

This is the 12th Prop. of the same Section (see *Plate* 7. *Fig.* 1.)

PROP.

PROP. V.

Between two parallel Lines, or two Lines whatſoever, that are in the ſame Plan, or between a Point and a Line, there can be but one Plan imagined.

This is the 7th of the 11th Book of *Euclide*, and the firſt Theorem of the firſt Section of my *Elements*.

PROP. VI.

Two Plans agreeing in three points that are not in the ſame line, agree intirely.

This is the 2d Theor. of the ſame Section.

PROP. VII.

Two lines, AC *and* BD, *being perpendicular on the ſame Plan, they may be imagined in one Plan.*

This is the tenth Theorem of the firſt Section of the fifth Book of my *Elements of Geometry*, which I cite always in this Chapter, becauſe 'tis in that Section that I demonſtrate what happens when Plans cut each other, (ſee *Plate* 7. *Fig.* 2.)

PROP.

PROP. VIII.

X *and* Z *being two Plans perpendicular on* Y, *their Section* A B *must likewise be perpendicular on* Y.

This is the 12th Theorem of the foresaid Section, and the 19th Prop. of the 11th Book of *Euclide*, (see *Plate* 7. *Fig.* 3.)

PROP. IX.

The Sections A B *and* C D *of two parallel Plans cut by a third, are parallel lines.*

'Tis the 16th Theor. of the same Section, and the 16th Prop. of the 11th Book of *Euclide*, (see *Plate* 7. *Fig.* 4.)

PROP. X.

The line C E *in the Plan* Z, *being parallel to* A B, *the Section of* Z *and* X, *is likewise parallel to another line drawn on the Plan* X *parallel to* A B.

This is the 9th Prop. of the 11th Book of *Euclide*, and the 17th Theor. of the forecited Section, (see *Plate* 7. *Fig.* 5.)

PROP.

PROP. XI.

Z and X *are two Plans which cut each other;* A B *is parallel to* D F; *if the lines* C D, M O, E F, *are parallel amongst themselves, I say the Angles* C A D, M N O *and* E B F *are equal.*

This is the 18th Theor. of the same Section of my *Elements*, and the 10th Prop. of the 11th Book of *Euclide*, (see *Plate* 7. *Fig.* 5.)

PROP. XII.

Two lines cut by parallel Plans, are cut proportionably.

See the 17th Prop. of the 11th Book of *Euclide*, and the last of the first Section of my fifth Book of *Elements of Geometry*, where the Demonstrations of these Propositions are to be found, of which I would only renew the Idea, for the more easie reading the following Treatise.

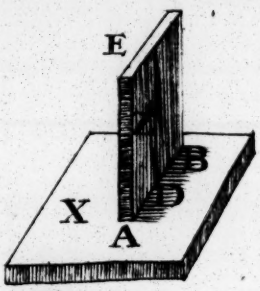


Fig: 1

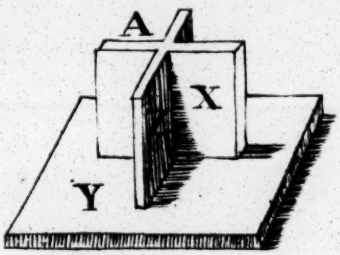


Fig: 3

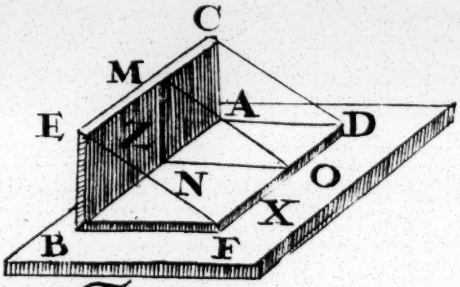


Fig: 5

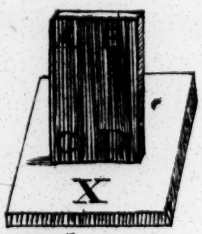


Fig: 2

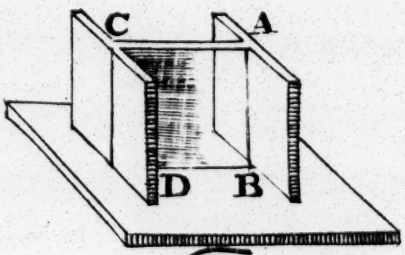


Fig: 4

CHAP. IV.

Of the Properties of the Sections of a Picture, and the Plan made by the Rayes that come to the Eye from the viſible Object.

THEOREM I.

The Perſpective of a point, is a point.

DEMONSTRATION.

A Viſible point is ſeen by a Ray which is a right line, Chap. 2. Sup. 1. the place where this Ray cuts the Picture, is the Perſpective of the viſible point, Chap. 2. Sup. 2. now a right line piercing a Plan, cannot cut it but in one point, by the Corol. of the 1ſt Prop. Chap. 3. therefore the Perſpective of a viſible point is a point.

THEOR. II.

The Perſpective of a viſible right line, is a right line.

DEMONSTRATION.

The Rayes by which a line is ſeen, that paſſes not through the Eye, tho' prolong'd, make

make a Plan, Sup. 2. Chap. 2. which cuts the Picture: Now this Section (the Perspective of the right line by Sup. 5. Chap. 2.) is a right line, Prop. 3. Chap. 3. Therefore the Perspective of a right line, is a right line.

THEOR. III.

The Perspective of a line in the Geometrical Plan, parallel to the ground line, is likewise parallel in the Picture to the same ground line.

B C is parallel to F G, it must be demonstrated that D E, the Perspective of B C, is likewise parallel to F G.

DEMONSTRATION.

The right line B C on the Geometrical Plan Z, being parallel to the ground line F G, we may imagine a Plan on B C parallel to the Picture, which is elevated on G F. Now the Rayes by which the Eye A sees the line B C forming the Plan A B C; (by Sup. 2. Chap. 2.) the common Section of that Plan, with the two parallel Plans aforesaid, give the two parallel lines B C and D E by the 9th Prop. Chap. 2. Now by the 10th, D E being parallel to B C, it must be so likewise to the ground line G F, which was to be demonstrated, (see *Plate* 8. *Fig.* 1.)

ADVER-

ADVERTISEMENT.

This Proposition holds, tho' the line B C be not in the Geometrical Plan, provided it can be imagined in a Plan parallel to the Geometrical.

COROLLARY.

The Perspectives of all lines parallel to the ground line, are parallel amongst themselves.

They are all parallel to the ground line, and consequently to one another, because of their being all parallel to the same line.

THEOR. IV.

Let B C *be a line parallel to the principal Ray, and consequently perpendicular to the Picture, its Perspective being prolong'd, passes through the principal point, or point of sight.*

DEMONSTRATION.

The line B C being supposed parallel to the principal Ray A G, (*Plate* 8. *Fig.* 2.) is consequently perpendicular on the Plan of the Picture X, as is likewise A G. Suppose then a Plan between A G and B C, to wit, A G B C Prop. 7. Chap. 3. this Plan having the three points A B C common with the Plan A B C, shall be only the Plan A B C prolonged, Prop. 6. Chap. 3. Now the common Section of the Plan A G B C, with the Plan of the Picture,

is

is a right line, Prop. 3. Chap. 3. ſuch as E F, which muſt paſs through the principal point F, becauſe the point F muſt be in the Plan A G B C, as well as in the Plan of the Picture, and becauſe the Section of the Plan A B C, and the Picture, is a part of E F, to wit, D E; then D E, Perſpective of B C, being prolong'd, will be equal to E F, and conſequently paſs through the ſaid principal point F, *which was to be demonſtrated.*

COROLLARY.

The Perſpectives of two or more lines perpendicular to the Picture, being prolong'd, cut each other in the ſame point.

This is evident, becauſe they cut one another in the principal point; and therefore this point is call'd, the point of *Concourſe.* It is likewiſe call'd the *Center*; and the Lines that meet there, are call'd *Radial.* Theſe *Radial* Lines are likewiſe called *Fleeing*, becauſe they ſeem to ſhun us, as we have ſaid before, in diſappearing as they approach the principal point. Theſe Lines, if cut according to a certain proportion, ſerve as a Scale, on which all the Meaſures may be taken for finiſhing the Perſpective. Theſe are call'd *Fleeing Scales*, to diſtinguiſh them from *Geometrical Scales*, whoſe parts are equal, whereas the others are unequal.

THEOR.

Fig: 1

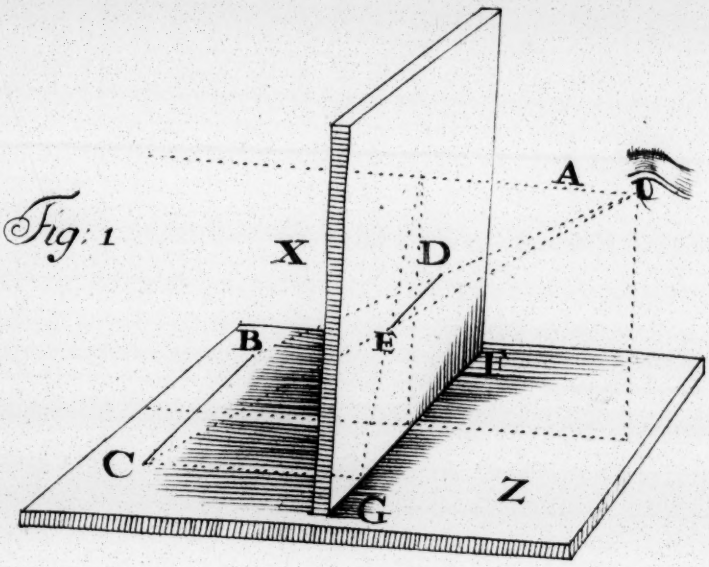
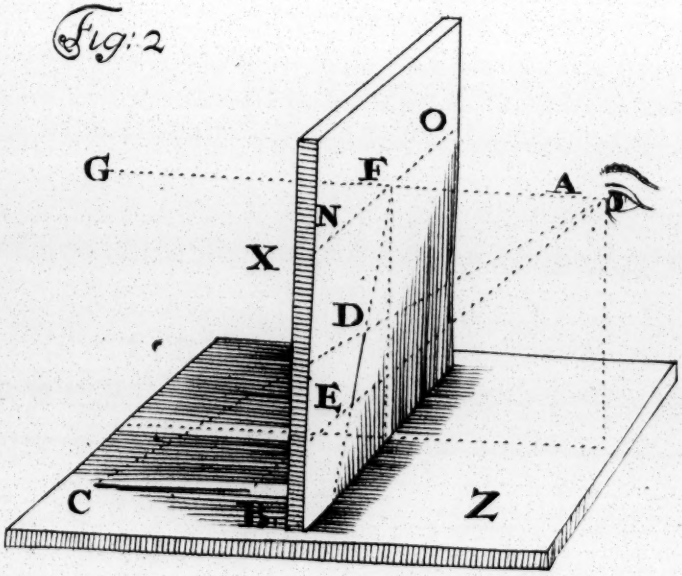


Fig: 2



THEOR. V.

The Perſpective of any Line which is in the Geometrical Plan, or parallel to it, if it be not parallel to the Picture, when continued, cuts the Horizontal Line.

DEMONSTRATION.

We have proved that the Perſpective of a Line perpendicular to the Picture, and conſequently parallel to the Geometrical Plan, on which the Picture is perpendicular, being continued, paſſes through the Principal Point: Now the Principal Point is in the Horizontal Line.

Let M be a Line parallel to the Geometrical Plan (*Plate* 9. *Fig.* 1.) but inclined on the Picture Y, the Rayes by which it is ſeen make a Plan, which I call X, and which ends at the Eye, by which the Horizontal Plan paſſes, which I call K. Thus the Plan K will cut the Plan X. I call O the Perſpective of M, which being prolong'd, paſſes through the common Section of X, of K, and of Y, and conſequently through a point of the Horizontal Line B C, which is the Line where the Horizon cuts the Picture. So the Perſpective of all Lines parallel to the Geometrical Plan, perpendicular or inclining on the Picture, being prolong'd, cut the Horizontal Line; *which was to be demonſtrated.*

THEOR. VI.

Two Lines parallel to each other, and to the Geometrical Plan, provided they be not parallel to the Picture, cut each other in the ſame point of the Horizontal Line.

DEMONSTRATION.

Firſt, This hath been proved of Lines perpendicular to the Picture, and parallel to each other; for their, Perſpectives being continued, cut in the Principal Point, which is in the Horizontal Line.

Secondly, The two lines M N (*Plate* 9. *Fig.* 1.) are parallel to each other, but not to the Picture on which they incline. Their Perſpectives are O P, which being prolong'd by the former propoſition, cut the Horizontal Line B C. It remains then only to prove, that they cut in the ſame point. I call Z the Plan of the Rayes by which N is ſeen, and X of thoſe by which we ſee M; theſe two Plans, X and Z, cut one another, becauſe they both terminate at the Eye; and their Section is parallel to M and N, becauſe theſe two lines are parallel, *Prop.* 10. *Chap.* 3. The Plan of the Horizon K, which paſſes through the Eye, cuts likewiſe the two Plans X and Z. Now this Section is ſtill parallel to M and N, becauſe it is parallel to the Geometrical Plan, *Prop.* 9. *Chap.* 3. then all theſe Sections make but

but one Line which cuts the Horizontal Line B C in the ſame point, to wit A, which in this caſe is call'd *Accidental*, to diſtinguiſh it from the principal point.

COROLLARY.

Several Lines being parallel to the Geometrical Plan, and to each other, if one of theſe Lines, and a point of another, be known, they are all known.

For firſt, if theſe Lines be perpendicular on the Picture, they meet at the principal point; ſo there are two points known, through which each of theſe Lines paſſes.

Secondly, If theſe Lines be inclining on the Picture, they meet all in the *Accidental* point, ſo there are ſtill two points known, through which each of theſe Lines muſt paſs.

PROBLEM.

Several Lines being given parallel amongſt themſelves, and to the Geometrical Plan, and inclining on the Picture, how to find the Accidental point.

It ſuffices to prolong the Perſpective of one of theſe Lines; for the point where it cuts the Horizontal Line, is the *Accidental* point, where the Perſpectives of the other lines meet, according to the foregoing *Theorem*.

THEOR. VII.

The Perſpective of a line which is perpendicular on the Geometrical Plan, is perpendicular on the ground line.

DEMONSTRATION.

Suppoſe the Line B C perpendicular on the Geometrical Plan Z (ſee *Plate* 9. *Fig.* 2.) The Plan A B C, and the Picture X, are perpendicular on Z; ſo their Section H E is perpendicular on Z, and therefore on the ground line F G (*Prop.* 8. *Chap.* 3.) Now D E part of H E, is the Perſpective of B C; therefore the Perſpective of a perpendicular line, is a perpendicular, which was to be demonſtrated.

THEOR. VIII.

The Perſpective of one or more lines perpendicular on the Geometrical Plan, are all parallel.

DEMONSTRATION.

By the foregoing *Theorem*, the Perſpectives of lines perpendicular on the Geometrical Plan, are perpendicular to the ground line, or baſe of the Picture. Now it is proved in the *Elements*, that perpendiculars on the ſame line, are parallel amongſt themſelves; then by conſequence theſe Perſpectives are parallel amongſt themſelves.

THEOR.

Plate 9

Fig: 1

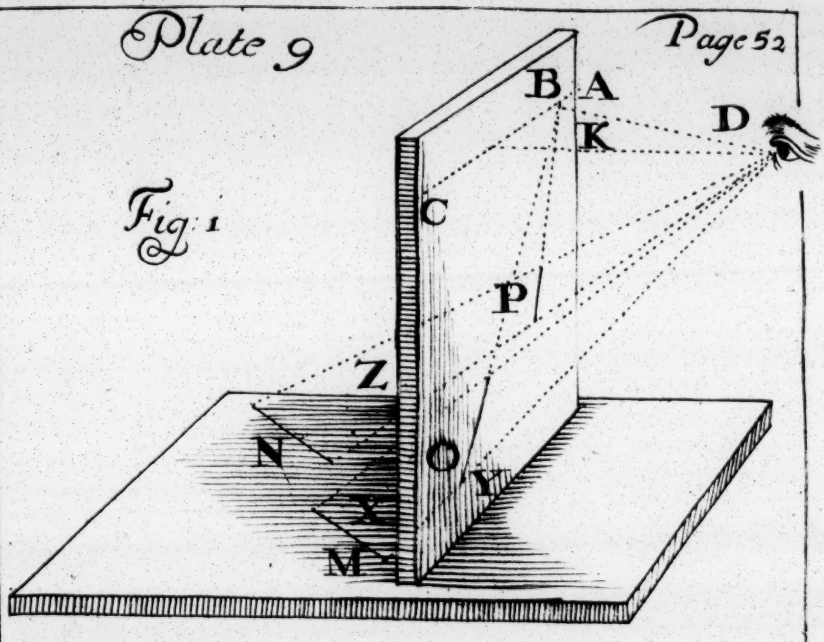
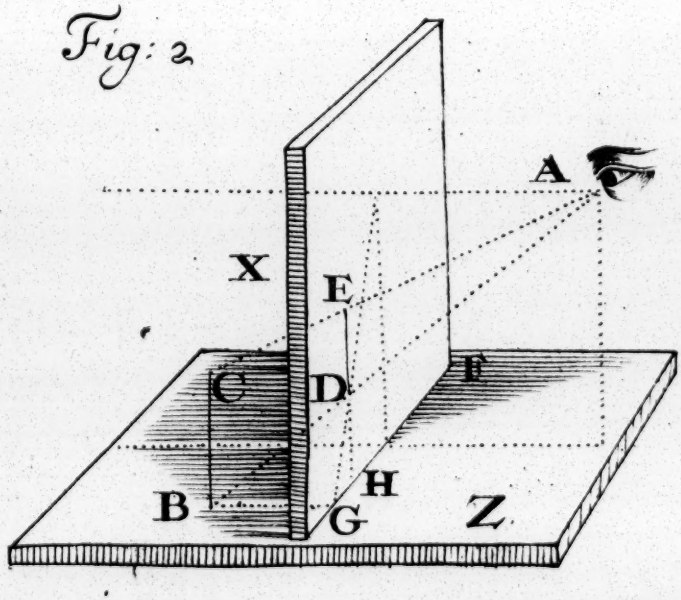


Fig: 2



THEOR. IX.

The Perſpective of a line inclining on the Geometrical Plan, is inclined after the ſame manner on the ground line, where it makes the ſame Angle.

We ſuppoſe this line, which is inclining on the Geometrical Plan, to be parallel to the Picture.

DEMONSTRATION.

B C is a line inclining on the Geometrical Plan Z, its Perſpective is the line D E, which being prolong'd to the baſe of the Picture H I, I ſay D G makes the ſame Angle on H I, as B C on *Z*, (ſee *Plate* 10. *Fig.* 1.) B C is ſuppoſed, as I have ſaid, parallel to D G, having then taken G F equal to B C, C F muſt be parallel to B G; and ſo the Angle D G I, or F G I, is equal to C B L, according to what hath been demonſtrated in *Prop.* 11. *Chap.* 3.

COROLLARY.

The Perſpectives of lines equally inclining on the Geometrical Plan, are parallel.

Theſe lines are all ſuppoſed parallel to the Picture.

By the preceding Demonſtrations they make the ſame Angle on the ground line, and conſequently they are parallel, according to what hath been ſhewn in the *Elements of Geometry.*

THEOR. X.

Two or more equal lines being perpendicular, or equally inclined on the same side, and on the same line perpendicular to the Picture, their Perspectives are betwixt two lines, which terminate at the Principal Point.

DEMONSTRATION.

Let there be on the same line H K, the equal lines L H, I M, and N K perpendicular or equally inclin'd, the Perspective of H K, is in the line D A, which terminates at the principal point A (*Theor.* 4.) then the Perspectives of the points H I K, common to these lines, and to the line H K, are in A D, at the points D, C, B; and because H L, I M, and K N are equal, perpendicular, or equally inclin'd, on the same side, their tops must be in one line perpendicular to the Picture, to wit in L N, whose Perspective is in G A, which terminates at the principal point A (as by the same *Theor.*) and consequently L, M, N; the tops of these lines and common points to the line L N, are in the line G A, to wit, at the points G, F, E; which was to be demonstrated, (see *Plate* 10. *Fig.* 2.)

CO-

Plate 10 Page 54

Fig: 1st

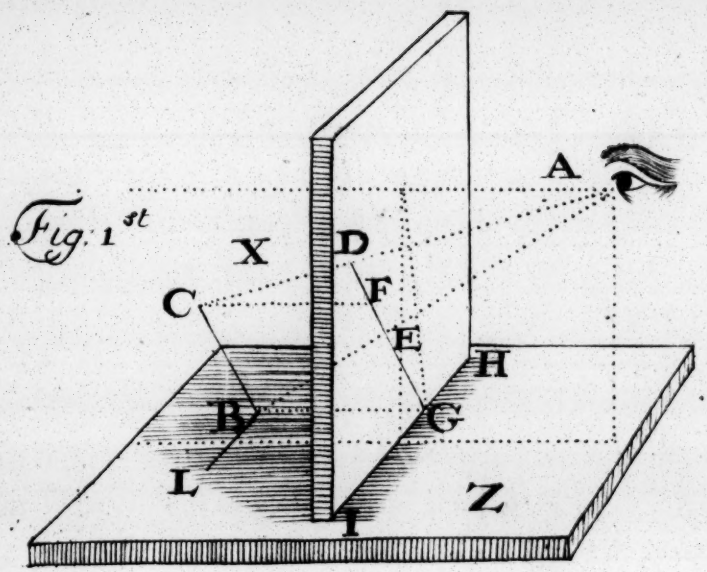
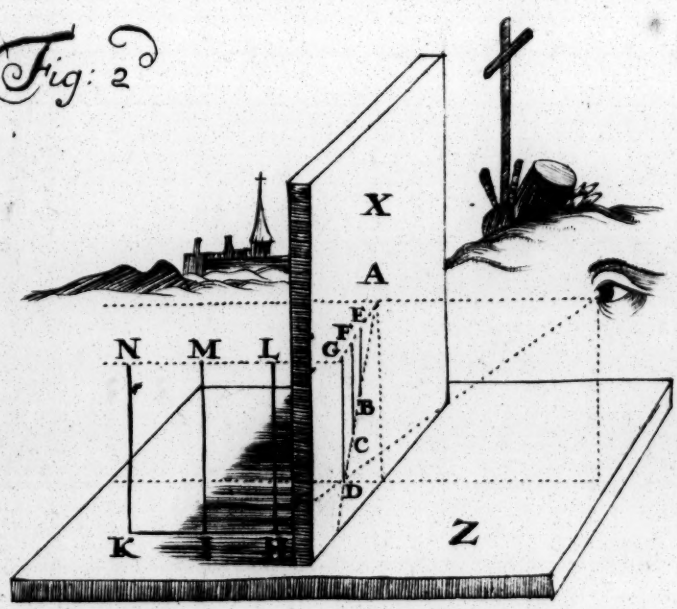


Fig: 2



COROLLARY.

Several lines being given, equal and perpendicular on the ſame line as on H K, *after having found the Perſpective of the firſt line* H L, *and the top or baſe of the others, the reſt is eaſily found.*

For the Perſpectives of theſe lines are parallel (*Theor.* 7 & 8.) then by drawing parallels to the line D G, the Perſpective of H L, by the points D, C, B, or G, F, E, between A G and A D, the Perſpective of H L, I M, K N, are found.

THEOR. XI.

The Perſpective of a line being a line; I ſay, the parts of the Perſpective of a line parallel to the Picture, are proportionable to thoſe of the line, whoſe Perſpective it is.

Suppoſe B D parallel to the Picture X, and divided in the point C (*Plate* 11. *Fig.* 1.) its Perſpective is E F; ſo E is the Perſpective of B, F of D, and G of C. Now E F is parallel to B D; therefore as D C is to C B, ſo is F G to G E.

COROLLARY.

If the parts B C *and* C D *of the line* B D *are equal, the parts* E G *and* G F *of the Perſpective* E F, *are likewiſe equal.*

This is evident.

THEOR. XII.

The Perſpective of a Figure, parallel to the Plan of the Picture, is ſimilar to that Figure.

DEMONSTRATION I.

The Angles comprehended between the ſides of the Figure, are equal to thoſe of the Perſpective, becauſe all the lines of the Perſpective make the ſame Angles with the ground line, as thoſe made by the Lines of the Figure, (*Theor.* 9.) So the Figure of the Perſpective is ſimilar to the viſible Figure.

DEMONSTRATION II.

The Rayes that come from this Figure to the Eye, make a Pyramid, of which this Figure is the baſe. The Picture is ſuppoſed parallel to this Figure; therefore its Section with the Pyramid is likewiſe parallel to this Figure, and conſequently ſimilar, as is demonſtrated in my *Elements*. Now this Section is the perſpective of the ſaid Figure, therefore the Perſpective of a Figure parallel to the Picture, is ſimilar to that Figure.

COROLLARY I.

The Perſpective of a Square or a Circle, &c. *parallel to the Picture, is a Square or a Circle.*

This is a neceſſary Conſequence, becauſe in this caſe the Figure of the Perſpective is ſimilar to the viſible Figure.

COROLLARY II.

The Perspective of the parts of the Front of a piece of Architecture, that are on the same line, keep the Proportions of the parts of the said Front.

COROLLARY III.

Any part of the Perspective of a piece of Architecture, or its Diminution, being known, the rest is easily found.

Make only a Scale of *Diminution*. If (for instance) the *Architecture* is diminished half in the Perspective, then take half of each part.

THEOR. XIII.

The Perspectives of equal parts of a Line, perpendicular to the Picture, are unequal.

Suppose B E a line perpendicular to the *Picture*, and divided equally by the points C and D (*Plate* 11. *Fig.* 2.) the Perspective of this line is F G; which we must prove not to be equally divided.

DEMONSTRATION.

If B E and F G were equally divided, then they would be parallel; but since E B is perpendicular to the *Picture*, in the Plan of which is F G, they cannot be parallel; therefore not being divided according to the same Proportion, the parts of the Perspective F G, cannot be equal, as those of B E are: *Which was*, &c.

LEM-

LEMMA.

The baſe B E *of the Triangle* A B E, *being divided into equal parts; I ſay Firſt, of the Angles of which the equal parts are the Baſes, the higheſt are the leaſt: Secondly, in the Triangle* F A G, *the baſe* F H *of the ſuperior Angle, is leſs than* H I *the baſe of the inferior.*

DEMONSTRATION.

Firſt, The lines A B, A C, *&c.* (*Plate* 11. *Fig.* 2.) become longer as they are more diſtant from the perpendicular A M. So A E ſhall be greater than A C. Then if the angle E A C were equally divided, *Euclide*, *Book* 6. *Prop.* 3. A E, A C :: E D, D C; then E D would be greater than D C; but being ſuppoſed equal, the ſuperior angle E A D ought to be ſmaller than D A C, or F A H than H A I, and ſo of the reſt.

Secondly, All lines, as A F, A H, *&c.* as they are more diſtant from the perpendicular A P, become longer; ſo A F ſhall be leſs than A I. If then in the triangle F A I, the angle A be parted equally, *Euclide*, *lib.* 6. *Prop* 3. F H, H I :: F A, A I. Then F H would be leſs than H I, for that reaſon, and becauſe the angle F A H is leſs than H A I; which we have demonſtrated (*Plate* 11. *Fig.* 2.)

THEOR.

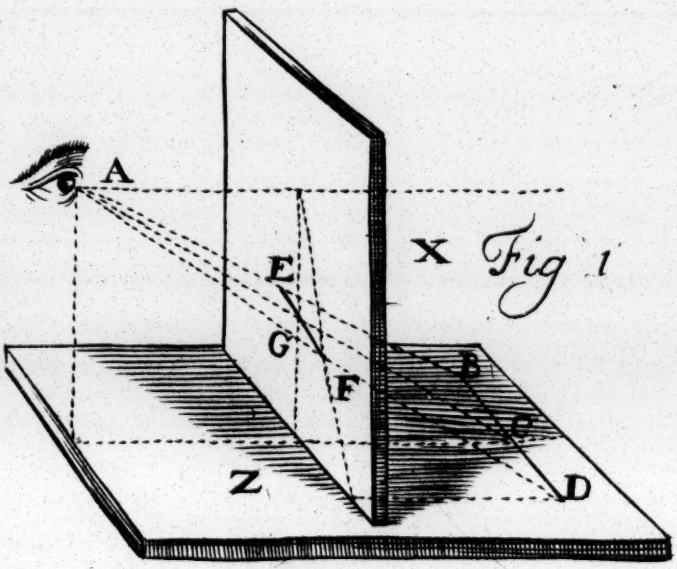


Fig 1

Plate ii

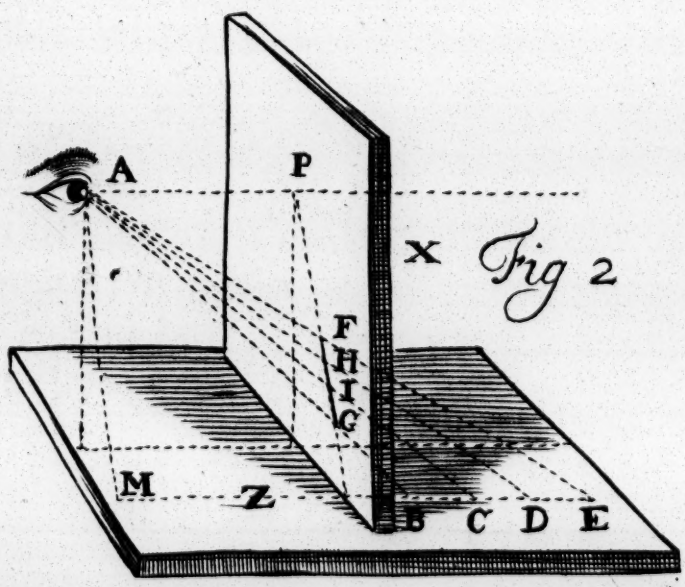


Fig 2

THEOR. XIV.

The Perſpectives of the parts of the line B E (the ſame Figure, and the ſame Caſe, as in the foregoing Theorem) *that are remoteſt, are ſmalleſt.*

This has been proved in the foregoing *Lemma.*

THEOR. XV.

The farther Objects are from the Picture, their Perſpectives are the ſmaller.

If the line B E were infinitely prolong'd, and ſtill divided in equal parts (*Plate* 11. *Fig.* 2.) the laſt of theſe parts would have the leaſt Perſpective. So the Perſpective of that object which is the baſe of the ſame angle in the *Picture*, is leſſer. It is evident (ſame *Figure*) that if the Eye A draw back from the *Picture* X, or if B E be placed at a greater diſtance; as the Rayes A B and A E grow longer, the angle B A E becomes leſs; and the ſecond baſe F G Perſpective of B E becomes ſhorter. *Which was, &c.*

CO-

COROLLARY.

In removing the Eye too far from the Picture, or in repreſentiug Objects at too great a diſtance on the other ſide the Picture, all muſt be confuſed.

For inſtance, in the Perſpective of a too long row of Columns, all the Columns muſt be confounded. This depends particularly on the ſituation of the Eye, in regard of the Objects. The Eye and the Objects being determined in their ſituation, the *Picture* may be nearer or farther from the Eye. When it is nearer the Eye, the Perſpective is really leſs; and the contrary when it is more remote, tho' the Object appear ſtill of the ſame bigneſs, and under the ſame angle: For 'tis the diſtance from the Object to the Eye, that makes the different Senſation, and not the *Picture* which changes not the Senſation, be it near or far from the Eye.

THEOR. XVI.

The Perſpective of all Objects placed lower than the Eye, is below the Horizontal Line; but above the Horizontal Line, if the Objects be placed higher than the Eye.

DEMONSTRATION.

Suppoſe B an Object below the Eye A (*Plate* 12. *Fig.* 1.) ſeen by the Ray A B, the Horizontal

Horizontal line is E F, and the principal Ray A D, parallel to the Geometrical Plan. If B were drawn back infinitely, the Ray A B could never reach the Horizontal line E F; becauſe it ought firſt to be parallel to A D, and then B would not be below E F, or A D, as it is ſuppoſed to be ſituated.

Let C be a viſible point above A D or E F, the line A C ſhall never reach E F for the ſame reaſon; and conſequently the Perſpective C, ſhall not be found below E F. (*Which was, &c.*)

THEOR. XVII.

The Perſpectives of Objects that are below the Eye, are higher, the remoter the Objects be; and thoſe of Objects above the Eye, are lower, the remoter they be.

DEMONSTRATION.

It is evident, that the farther B is removed, the Ray A B draws nearer the line A D, which is the principal Ray, (*Plate* 12. *Fig.* 1.) and ſo cutting the *Picture* nearer the Horizontal line E F, the Perſpective of B becomes higher: So that the more C is removed, the Ray A C drawing near or deſcending to A D, cuts the *Picture* nearer E F; and conſequently the Perſpective deſcends nearer

nearer to the line E F. I do not mean that C ſhould be remoter by prolonging the Line A C, for then its Perſpective would be ſtill in the ſame point E, tho' it were infinitely prolong'd; but ſo as the Object, whither near, or at a diſtance, ſhall be ſtill at an equal height above the Horizontal Line.

THEOR. XVIII.

The Perſpective of a Point of an equal height with the Eye, or Horizontal Line, is always found in the Horizontal Line.

This is evident; for the Ray or Line that comes from that point to the Eye, is parallel to the Geometrical Plan, on which it hath two points equally elevated. 'Tis therefore likewiſe parallel to the Horizon; and paſſing through the ſame point to wit the Eye, it muſt neceſſarily cut the Horizontal Line.

COROLLARY.

Conſequently if ſeveral Figures on the Geometrical Plan, were of the height of the Eye, or of the Horizontal Line, the Perſpectives of their tops would be all found in the Horizontal Line.

This is clear.

THEOR

THEOR. XIX.

A Point being given in the Geometrical Plan, if a perpendicular be drawn from this Point to the Picture, and from the same Point a line be drawn parallel to the Picture, the Perspective of that Point, will be the Point of Section of the Perspectives of these two Lines.

DEMONSTRATION.

The Point given in the Geometrical Plan, whose Perspective we look for, let it be the Point A, (*Plate* 12. *Fig.* 2.) draw the Line A B perpendicular to the *Picture*. G is the Principal Point. Then by the (*4th Theor.*) the Perspective of A B, and consequently of A, part of A B, is in the line B G.

Suppose A H a line parallel to the base of the *Picture*, passing through the point A, whose Perspective we look for: Suppose likewise F E to be the Perspective of A H, which Perspective is parallel to the base of the *Picture*, *Theor.* 3. Now A is in the parallel A H, and in the perpendicular A B, so that the Perspective of A, which is in the Perspective of these two lines, is certainly in the common Section of B G, and E F, the Perspectives of A B and A H: *Which was, &c.*

COROL-

COROLLARY.

Having thus found the Perspective of the Line parallel to the Picture, where A *the visible Point is; draw from its point of Incidence, a Line to the Principal Point, and the Perspective of* A *is found.*

For the Point of *Incidence* of A, according to the Definition (*Chap.* 2. *Def.* 6.) is the Point where the Perpendicular falls, that is drawn from the visible Point to the *Picture*: Now the Perspective of the visible Point, is in the Perspective of that Perpendicular; and so in the common Section of that Perspective with that of the parallel Line that passes through the visible Point A, in the Geometrical Plan.

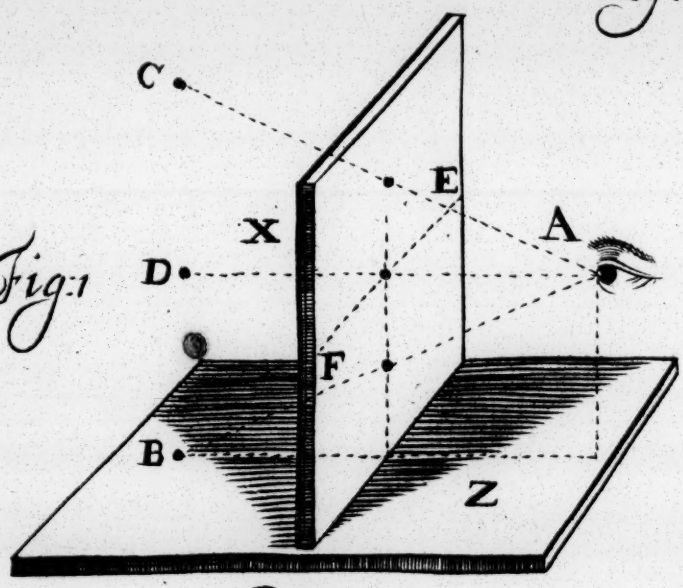


Fig: 1

Plate 12

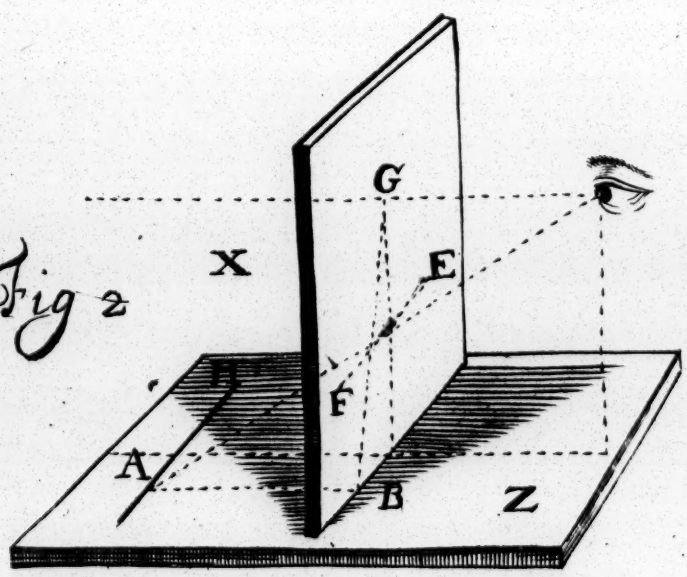


Fig 2

CHAP. V.

Of the Diſpoſition of the Objects deſign'd to be repreſented; and of the Situation of the Picture, or Perſpective Plan, with relation to thoſe Objects, and to the Point from whence it ought to be ſeen.

THE Art we here treat of, conſiſts in finding in a Picture, the paſſage of the Rayes, which would ſhew the Objects that are behind it, if it were tranſparent. Before we ſearch for this paſſage, we muſt conſider which is the ſituation of the *Picture*, with relation to the Objects we would repreſent, and to the point of ſight, from whence it ought to be ſeen. This will make three Heads, which ſhall be the ſubject of this Fifth Chapter.

I.

Of the Diſpoſition of the Objects on the Geometrical Plan.

What the ordinary Painters do by chance, and at random, he that is a *Geometrician* can

do artfully and preciſely. We have already ſaid, that every Picture is ſuppoſed to be on a Geometrical Plan, and that it is there, *Vertically* or *Perpendicularly*, if it be not mentioned to be in another ſituation. We have likewiſe ſuppoſed the Geometrical Plan to be Horizontal, that is to ſay, parallel to the Horizon. 'Tis on a regular Plan, that we ought always to conceive the Objects, whoſe Perſpective we ſearch after, to determine and meaſure their juſt Situation, in regard to the *Picture* and point of ſight.

Altho' the ſubject be given, and that it doth not depend on the Painters choice, he may imagine it under the fineſt Form it is capable of, in which he ſhews his Ingenuity. The Features and Colours are the Materials, which can only expreſs the body of the ſubject; the Diſpoſition we ſpeak of, paints what the Senſes cannot perceive; and this is called the Spiritual part of *Painting*. But 'tis not my buſineſs to explain this Diſpoſition, becauſe I talk of *Painting*, in ſo far as it borrows the help of the *Mathematicks*, to determine in the *Picture*, the place where each thing ſhould appear.

When the Subject is great, and contains ſeveral things, the Imagination is not ſtrong enough to comprehend them all, in the Diſpoſition in which it is deſired they ſhould appear.

pear. He muſt at leaſt have ſome help to fix and ſupport his Imagination, and to keep it ſtill lively, for ſuch a time as is neceſſary for a Painter to expreſs with his Pencil and Colours, what it repreſents to him. Therefore it is, that thoſe who deſire to ſucceed, make uſe of this Artifice: They diſpoſe on a ſort of Theater all they would repreſent; after which they take their Meaſures, their height, their diſtance from the *Picture*, and from the Eye of the Spectator. They mark their Situation on the Geometrical Plan, with relation to the baſe of the *Picture*, and to that Vertical Line which is the Section of the Geometrical Plan, and of a Vertical Plan, which paſſes by the Principal Point of the *Picture*.

The thing is neither ſo long, nor ſo difficult, as it appears; it may be made eaſie. To that end we muſt imagine the Geometrical Plan to be a Square divided into ſeveral other ſmall Squares, by the help of which, the place of each Object, and the *Ichnography* or Plan of the whole ſubject is determined. This Plan cannot be made, without ſearching the point of *Seat* of all that is above the Geometrical Plan That is to ſay, it muſt be found in what point of this Plan, or in which of theſe little Squares that divide it, a perpendicular line falls, from the point of the

Object which is in the Air. 'Tis this Perpendicular that meaſures the height of that point.

If *(for inſtance)* it were deſired to put a Statue in Perſpective, according to the Rules; to find the Perſpective of its principal points, we muſt conſider which is the Situation of its Foot, and after that of the upper parts, by letting fall a Plummet, which gives their point of *Seat*.

Let us make this more intelligible by ſome eaſie Example. If the Octaedre X were to be put in Perſpective (ſee *Plate* 13. *Fig.* 1 & 2.) that is to ſay, the body X having eight ſides, it muſt be examined where the Perpendiculars lines B *a*, C *b*, D *c*, E *d*, A F do fall, which meaſure the height of its angles. The foot of theſe perpendiculars makes the Figure *a b c d*, which muſt be put in Perſpective; then ſearching the Perſpective of all theſe perpendiculars, the points A, B, C, D, E, F are found, which being joyned by ſtraight lines, forms the body Z ſimilar to X.

This is neither difficult, nor very long. Now when the *Ichnography* of what you would repreſent, or at leaſt of the principal things is found, all is eaſie, and you may work ſafely; for the Perſpective of the *Ichnography* is eaſily found, in dividing (as hath been ſaid) the Geometrical Plan in ſmall

Squares

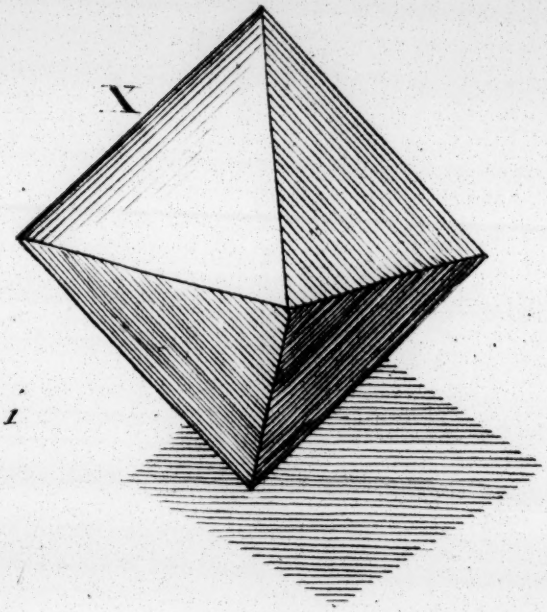


Fig: 1

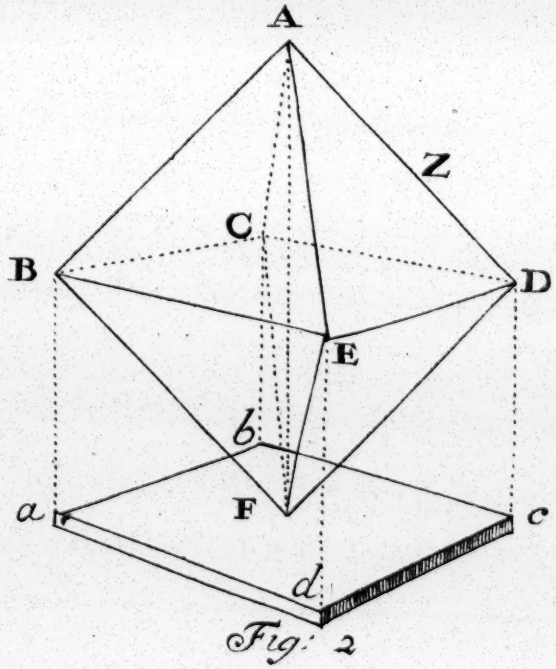
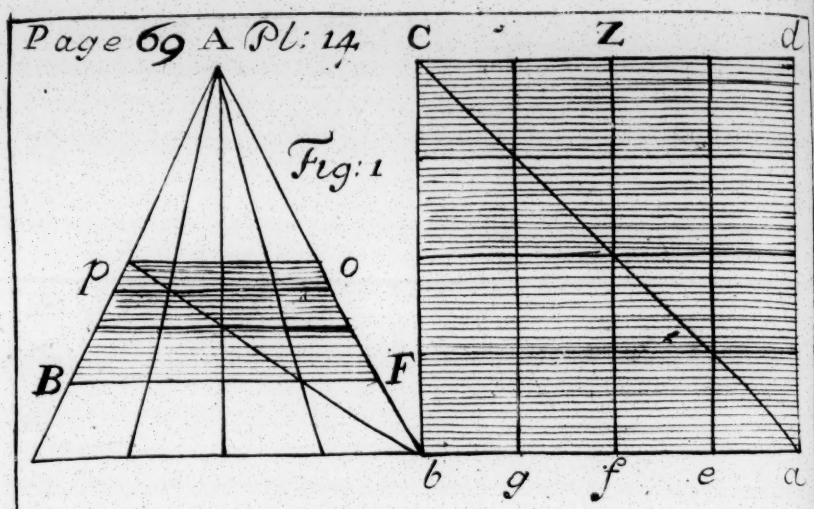


Fig: 2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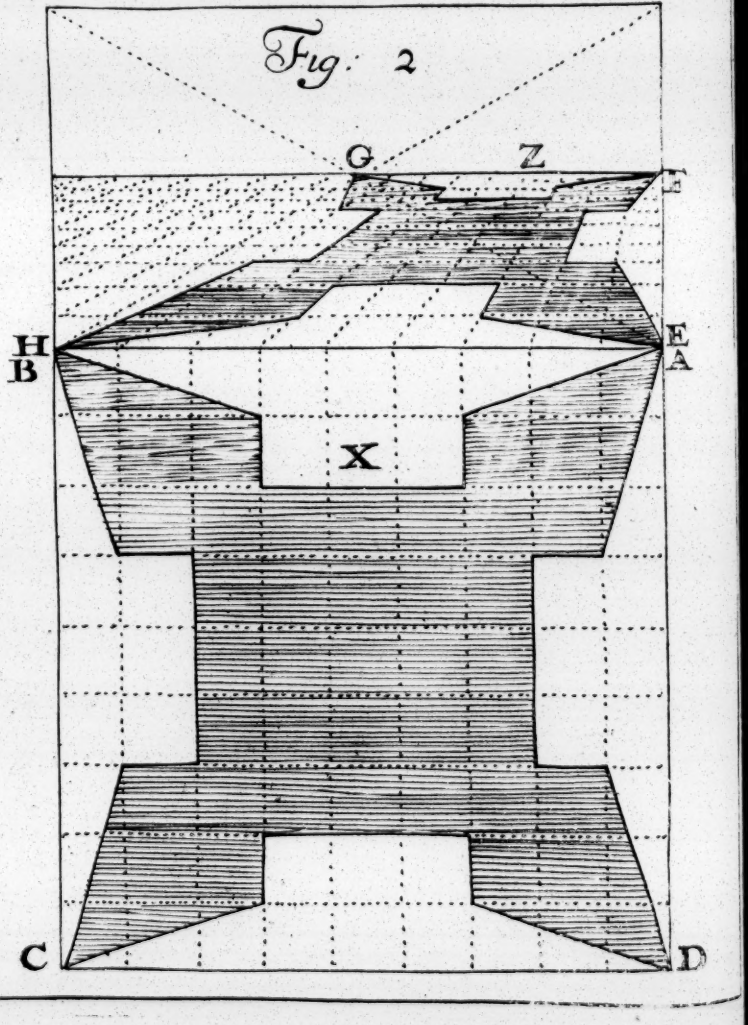
Fig: 2
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Squares. The whole Plan is conceived as a Square. Suppoſe then Z or the Square *a b c d* to be the Geometrical Plan, (ſee *Plate* 14. *Fig.* 1.) Divide the ſide *a b* in equal parts, by drawing right parallel lines by the points *e f g*. Divide likewiſe the ſide *a d* and draw parallels: Thus the whole Square will be divided into ſeveral ſmall Squares. The Perſpective will be found by the Operations which we ſhall ſhew in the next Chapter. This Perſpective is B F *o p*; which being found, it is eaſie to find the Perſpective of the *Ichnography* of the ſubject that is on the Geometrical Plan. This may be done with an eaſie practice, without any ſenſible error, by marking in the Perſpective of each ſmall Square, whatſoever is in that Square. The ſight of this figure alone makes it eaſily comprehended, (ſee *Plate* 14. *Figure* 2.) X or A B C D is the Geometrical Plan, on which we imagine a fortification. This Plan hath been divided in ſeveral ſmall Squares, which contains the Geometrical Ichnography of this Fortification. I ſuppoſe Z to be the Perſpective of this Geometrical Plan, and of the other Squares into which it is divided. By tranſporting then what is in the Squares of the Geometrical Plan, into the Perſpectives of the ſaid Squares, the Perſpective of the Geometrical Ichnography which was deſir'd, is found.

This is an admirable ready way to find what *Painters* call the *Degradation* of the *Picture*. The firſt Objects which are conceived behind the *Picture*, are thoſe which are the firſt beyond the Ground line, or baſe of the *Picture*. According as they are more diſtant, their Perſpective is raiſed, and at the ſame time gradually diminiſhed. This may be obſerved without *Perſpective*. Generally whatever is ſeen at a diſtance appears ſmaller. So a Figure, which on the baſe of the *Picture* ought to be five foot, may be placed at ſuch a diſtance, that it can have but four, or leſs if what it repreſents ought ſtill to be imagined more remote beyond the *Picture*. This is what I have been calling the *Degradation* of the *Picture*; which is known as ſoon as we have found the Perſpective of all the Geometrical Plan; and of the Squares into which it is divided. We know Geometrically the Diminution of each Object, as it is placed in ſuch or ſuch a parallel of the Geometrical Plan; for inſtance, How much a body of five foot, which is in the ſecond parallel line of the Geometrical Plan, ſhould appear diminiſh'd in the *Picture*; and how much in the third; and conſequently what is the *Degradation* of the *Picture*, or by how much muſt the natural ſize of the Object be diminiſhed, according to the place where its

Per-

Perſpective is put. This being as eaſie as it is neceſſary, *Painters* that neglect it are much to blame. And can do nothing well but by chance.

The Geometrical Plan, on which we imagine the Objects we would repreſent, may comprehend a great Country. But every thing may be reduced from great to ſmall; and we may ſuppoſe a Board or Table of five or ſix foot ſquare, to be a large Country. Neither is it neceſſary to make effectually any Geometrical Plan, it is enough to imagine it; and without marking the lines which are the meaſures of the Objects which are to be painted, we may expreſs them by number, theſe meaſures making only a Scheme of the *Picture* which is to be painted, as the *Architects*, who without drawing any line, calculate what they deſign to make, and make it known to the Workmen that are to execute it, marking by numbers all the meaſures of their Work, the ſize of its Plan, the length, and breadth of all the Apartments, the height of the Stories, and the largeneſs of the Windows. A *Painter* may likewiſe prepare his ſubject in his fancy, and write it down; He may mark it on Paper by numbers, determining the Situation of ſuch and ſuch a part, how many feet it is diſtant from the baſe of the *Picture*, how much it is elevated above

the Geometrical Plan, or depreſſed under it, and ſo make an exact deſign.

Painters have a great liberty: All is allow'd them, providing they claſh not in any thing with likelihood and decency. They may therefore imbelliſh and diſpoſe things to the beſt advantage. I believe likewiſe they may take ſome liberty in the Deſigns of Perſpective, which they make upon Paper to repreſent an Edifice, particularly when the buſineſs is only to give an Idea; and not to finiſh it, but only to ſhew which way it is done. If the buſineſs be to make a general view, they need not confine themſelves to a true Plan. For inſtance, if in this Plan there be found great Courts before the Entry, the Perſpective of theſe Courts which will be upon the baſe of the *Picture*, ſhall appear too great; whereas that of the Edifice which is to be repreſented, will appear too ſmall and confuſed. I believe that upon ſuch an occaſion they may imagine another Plan than the true one; that is to ſay, they may ſuppoſe one, ſuch, that the parts which they would render moſt ſenſible, may appear in the deſign, as obvious as is neceſſary. They muſt ſuppoſe the Court of entry leſſer; and if there be any Buildings on the Wings that they would make appear, they may detach them more than they are; that is to ſay, they may ſuppoſe

poſe the Court that ſeparates theſe Buildings to be greater, to the end that in the Perſpective theſe Buildings may not be confuſed. This can run them into no error, for the true Geometrical Plan, reforms and makes underſtood what is requiſite to be known.

There may be many things obſerved, touching the Diſpoſition of the Objects on the Geometrical Plan; but as I have ſaid before, it does not concern me. I ſhall only add, that a *Painter* ought to ſuppoſe nothing there, but what the Eye can comprehend at a ſingle view. We are now going to ſhew, that the Eye comprehends a greater or leſſer number of Objects, as it moves farther off, or draws nearer.

II.

Of the Situation and Size of the Picture.

A *Picture* can repreſent but one ſingle Action, or Actions that relate to one thing, and can be ſeen wholly at one view. The liberty of *Painters* is therefore not ſo great as that of *Poets*; theſe are indeed obliged to unity of Action, Time, and Place, whither it be in a *Comedy*, *Tragedy* or *Heroick Poem*. In *Drammatick Poeſy*, or Pieces of *Theatre*, the place is the *Theatre* it ſelf, on which all paſſes, or is there related if it has been acted elſewhere.

where. In *Heroick Poeſy* the place is all the Provinces which the Heroes have run over in the time in which the principal Action was done, which is the ſubject of the Poem. The time of this Action may be a whole Year. The Pieces of *Theatre* are allowed at moſt but twenty four hours. *Painters* are yet more ſtraitned, for they can only paint the Moment of one Action, the Situation where the things were in that Moment; the Figure, and the Character of the Paſſion with which every Perſonage was animated at that time. The Figure of all the Bodies, the Poſtures, the Viſage according to the Motions of the Spirit, which being active, is continually changing all theſe, which is impoſſible to be mark'd with a ſingle ſtroke of the Pencil; for the ſame Features cannot ſerve for quite different things. 'Tis then only the moment of an Action that hath its proper Features which can be painted. So the time of the Action, that is the ſubject of the *Picture*, is but one inſtant, becauſe the next inſtant will require other Features; the things having no longer the ſame Situation, the ſame Diſpoſition, nor the ſame Character.

Painters are likewiſe more ſtraitned than *Poets* in the unity of the Action: Every *Comedy* has five Acts; and every Act hath different Scenes, in which are ſeen different Ornaments, changings

changings of the Scenes, and ſtill ſomething that is new. In *Heroick Poems* they give Battel, and beſiege Towns. 'Tis not the ſame in Painting; as the Eye can ſee nothing diſtinctly, but what is before it, and that its overture is limited and narrow, it cannot receive but a ſmall number of Objects at once. Beſides that the Rayes that enter obliquely, cannot unite in the *Retina*, to form there the Image of the Objects from whence they come. Wherefore a thing is not diſtinctly ſeen, but when the Rayes by which it is perceived, fall directly upon the Eye, or miſs little of doing ſo. In changing place, or turning the Eye, things are diſcovered that were not ſeen before; but a *Painter* cannot repreſent exactly what is not ſeen at a ſingle view. There is great difference between *Sculpture* and *Painting*: A Statue that ſtands by it ſelf, can be ſeen on all ſides, and by parts; and every point from whence it is ſeen, hath a particular Circumference. But in a *Picture* there cannot be given to the ſame Figure different Circumferences, to terminate it by two different ſtrokes. So that if, in conſidering an Action, the place be chang'd, or the Eye turn'd, it is ſeen in a different manner, and then the ſame Figure can no more ſerve; for its Circumference will not be proper for it, but when it is ſeen in its firſt Situation.

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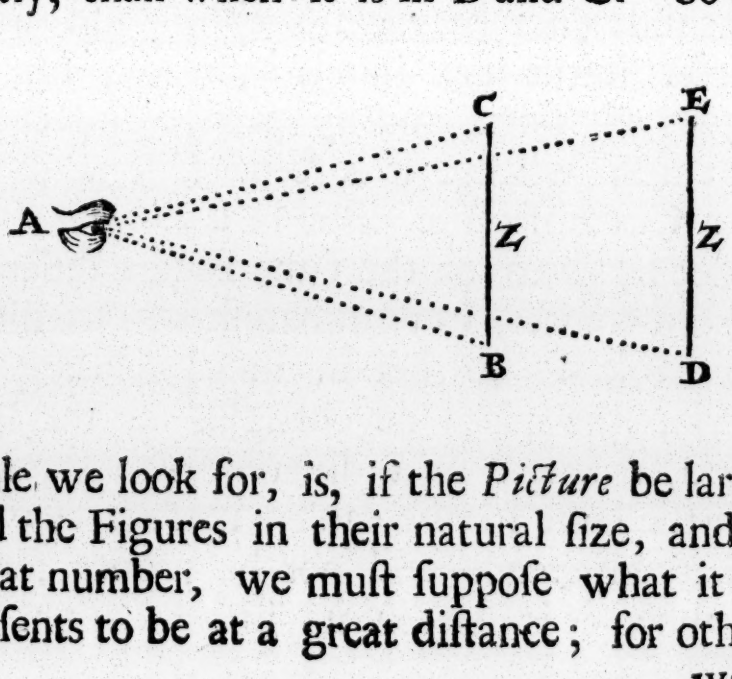
If we would repreſent different Actions to be ſeen at ſeveral times, we muſt make ſeveral *Pictures.* But finally, what Rule muſt we obſerve for the Grandure of the Action that is the ſubject of the *Picture*; or what ſize muſt we allow the *Picture?* To find this Rule, let us reflect on what we have been ſaying, that the Eye ſees not diſtinctly but what is before it; and that it is but little affected with what enters it ſlanting. Likewiſe the Eye rowls in the Head, and turns it ſelf to what it would ſee; it draws near, or retires to ſee better; for as this Figure makes plain, while the line Z is betwixt D and E more diſtant from the Eye, the Rayes by which it is ſeen, ſmite the Eye more directly, than when it is in B and C. So the



Rule we look for, is, if the *Picture* be large, and the Figures in their natural ſize, and in great number, we muſt ſuppoſe what it repreſents to be at a great diſtance; for other-

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ways 'tis impoſſible for the Eye to receive ſo many things at a ſingle view. For inſtance, Let us conſider the great Front of the *Louvre*. If we are near it, we can ſee but a ſmall number of Columns, which will ſtrike the Eye directly: Whereas in retiring to a reaſonable diſtance, the Eye, tho' it continue fixed, comprehends eaſily all this great Front, which becomes ſmaller, and contracts it ſelf, to be proportionable to the Capacity of the Eye. But if the diſtance be too great, the Objects become too ſmall; they appear no more, and the *Picture* is all confuſed.

We ſpeak here of a *Picture*, in which we would have things appear in their natural greatneſs; that is to ſay, that they make, as near as poſſible, the ſame Impreſſion upon the Eyes, as they would do in their natural State. To determine the greatneſs of this *Picture*, we muſt have a regard to what we would have appear there. But above all things, we muſt remember, that it ought not to be exceſſive large; that it ought to be proportioned to the Capacity of the Eye, which ought to ſee it wholly at one view. It may be done by taking a great diſtance, even tho' the *Picture* were very large; but then it would in a manner diſappear; all the ſmall parts would not be ſeen. Now a *Picture* is not made to dazle the Eye with colours, nor

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to ſhew ſtrokes that cannot be diſtinguiſhed at too great a diſtance.

Nevertheleſs there is no Action, whatever multitude of Actors it may have, but may be expreſſed in one Picture of a ſize proportionable to the Capacity of the Eye. There is a certain convenient diſtance, which hinders not from ſeeing what the Painter would repreſent. Battels and all ſorts of Actions which ſuppoſe a great Multitude of Perſons, may be repreſented, as is ſeen in a *Picture*, repreſenting a Basket of young Chickens. But which is that convenient diſtance? We muſt acknowledge it a little difficult to determine juſtly. To ſpeak nothing here at random, let us call to mind what we have ſaid ſeveral times; that a *Picture* ought to be conſidered as a Window. According to the largeneſs of the Overture of a Window, and the nearneſs of the Eye, we perceive more or fewer Objects. If we be near, and the Objects touch the Window, it is evident that what we ſee, is no larger than its Overture; which gives me reaſon to ſay, that the Rule which Painters ought to follow, is, that if the ſubject they treat of, ought to be imagined on the forepart of the *Picture*, they can place nothing there but what the largeneſs of the *Picture* allows to be repreſented in its natural bigneſs; ſo that if they be great Hiſtories,

which

which require a great number of Figures, a large place, or a Country, as the Eye cannot see so many things through a Window, if they be not at a convenient distance, so they ought not to be on the forepart of the Picture, but in the *Degradation*, and of a size much less than the natural; because every thing should diminish and decrease in proportion to its distance; and grow likewise more confused and dark. It is true, that when we are at the Window, 'tis not its Overture which limits the extent of the Objects which we may see. But as the Eye ought not to touch the *Picture*, that it ought to be at some distance, its largeness which represents the Overture of a Window, determines the greatness and multitude of the Objects which this Overture would let us see. According as we are near or far, it lets us see more or fewer Objects. So to resolve the Questions that may be made concerning the Disposition of Objects on the Geometrical Plan, and the situation and size of the *Picture*, we must consider which is the situation of the Eye, and at what distance it is from the *Picture*. Which shall be the subject of the next Head.

III. *Of*

III.

Of the Situation of the Eye, or of the Point of Sight.

The Situation of the Eye, in regard of the *Picture*, would ſeem to be left to our choice, becauſe the Rules that are given for *Perſpective*, are for all the different ſituations of the Eye. There is nevertheleſs a Rule, which is, to place it where naturally it ought to be, to comprehend the whole Object that can be ſeen through a Window, for as ſuch we now conſider the *Picture*. Sometimes it is placed in the Center; ſo generally ſpeaking, the principal point, that is to ſay, the point on which the principal Ray falls directly, ought to be in the middle of the *Picture*. But as we diſcover different Objects, according as we preſent our ſelves at a Window; that in looking ſideways we diſcover what we did not ſee when we look'd ſtraight forward, ſo we muſt place our Eye differently, according to the different ſituations of the parts we would ſee. *For inſtance*, being placed oppoſite to the Gate of a Church, I diſcover its front; but if I would ſee the ſides or wings of this Church, I muſt change my ſtation. So in repreſenting the ſides or wings of this Church, the point of ſight ought not to be in the middle

middle of the *Picture*, it may be ſometimes without the *Picture*; for it may happen, that to ſee the ſides and wings of a Church, whoſe Gate is exactly oppoſite to the Window from whence it is ſeen, we may be obliged to take a ſtation ſidewiſe, ſo as the principal Ray ſhall be without the overture of the Window and fall aſide. This is not ordinary; it is moſt natural to be placed oppoſite to the Center of the *Picture*, where by conſequence the principal point ſhould be. It is on this Center we look: What is directly oppoſite to the Eyes, is moſt ſenſible, and is beſt ſeen. So it is at the principal point, or near it, that the beſt Painters place the chief Perſon of the Hiſtory they repreſent; and who ought to attract the Eyes of the Spectators moſt.

The natural height of the point of ſight, is the natural height of the Eye. We ought then to ſuppoſe the point of ſight, and conſequently the principal point, which are both on a level, to be at the ordinary height of our Eye. But as there are Objects which cannot be ſeen, but from low to high, or from high to low, that we cannot ſee the Wainſcot of a Ceiling if the Eye be not below, nor the inſide of a Court ſurrounded with Buildings, if the Eye be not elevated higher than theſe Buildings; ſo there are Pictures, in which the principal point is above,

and there are others, in which it is below the *Picture.*

When we would ſee a great Edifice, we take our ſtation in the front, to the right, to the left, on the ground, or in eminent places, according as the Edifice is ſituated, and according to the parts we would diſcover. Such Perſpectives, whoſe point of ſight is placed in ſuch manner, as that we ſuppoſe the Spectator elevated in the Air, as if he were a Bird, are called, *Perſpectives at a Birds ſight.*

But the Eye without being raiſed above the Earth, can ſee things that are more elevated, and ſee them directly; for we may turn our head backward without incommoding us. Beſides the Eyes can turn themſelves upwards, ſo as the ſight of things much above their natural height, ſhall ſmite them in a direct line. This happens in *Pictures* which are placed above the Eye. But as we can ſee nothing through a Window which is above the Eye, but what is in that Window; and that we cannot perceive what is beyond it, unleſs it be in the Air, higher than the overture of the Window; ſo in a *Picture* repreſenting that Window, all ought to be forwards; and we ought to make the head appear, or the higheſt parts of what we conceive beyond that Window.

Pictures

Pictures that are placed in high places, are often made to incline, ſo as we muſt raiſe our Heads, and turn our Eyes upwards, to ſee them, to the end the principal Ray may be perpendicular to the *Picture*. In this caſe the principal point may be in the *Picture*, tho' it be placed above the Eye; but this is not natural, for the Perſons appear in a ſituation where they cannot be. A body inclining muſt fall, if it be not ſupported; ſo if the *Picture* be truly inclin'd, it muſt repreſent the Figures with ſo much Art, that they appear upright or ſtanding. We ſhall ſpeak of this Art in the ſeventh Chapter. Ordinary Pictures ought to be upright; if they be inclined, it is becauſe the Duſt may ſtick leſs to them.

We have already ſaid, that in a *Picture*, whatever is above the principal point, is ſeen lower; and that what is placed lower, is ſeen higher, and ſeems to mount; whereas what is placed above this point ſeems to deſcend. 'Tis evident that the Circumferences of Figures alter as they draw nearer, or remove farther from that point. Some ſhould be ſeen in front, when they are at the principal point, and directly oppoſite to the point of ſight; others are ſeen only in *Profile*; and ſuch a Figure as being placed on the left, ſhews the Stomack, in another ſituation would preſent

the Shoulders; this is the reaſon that thoſe who in their Deſigns make uſe of Figures borrowed and copied from the Draughts of diverſe Maſters, or from their own proper Studies in the Academy, ought to be careful to place them as they ſhould be, in relation to the point of ſight, under which they were firſt deſigned.

We have already ſaid, that a Figure, whatever it be, being once ſet on a Plan, can never have the ſame appearance in any other place of that Plan, to which it may be tranſported, if the point of ſight continue fixed. So that without the help of *Perſpective*, it is not eaſie for thoſe who ſteal any part of the Works of another Painter, to place it as it ought to be in a new Compoſition; as is obſerved by *Rowland Freard* of *Chantelon* of *Cambray*, in that excellent Idea he hath given of the Perfection of Painting.

It remains now to ſpeak of the juſt diſtance that is to be given to the point of ſight; this depends on the largeneſs of the *Picture:* What is large cannot be ſeen at once, if it be not at a diſtance; ſo that it is the ſize of what we would repreſent, that regulates this diſtance. When the Eye is too near, the Plan on which the Figures are placed, appears elevated in *Talus*, and the Diminution of the Figures is too ſudden, without a proportion to thoſe that

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are on the forepart of the *Picture*. On the contrary, if the point of ſight be more remote than it ought, the things are confuſed and huddled together. This point ought therefore to be at a moderate diſtance, which will be eaſier found by Experience, than by Arguments; for before any thing be concluded on, we ſee very near what effect the things will have, according as the point of ſight is at a diſtance, or near.

What we would have appear diſtinctly, ought to be ſeen very near, for what is ſeen at a great diſtance, we perceive confuſedly. Wherefore when we would repreſent diſtinctly any Object, the diſtance of the Eye ought not to be great. As we cannot diſcover a great Building at a ſingle view, unleſs we retire to a great diſtance, ſo the Perſpective of a large Building is never very diſtinct. Likewiſe if we would have our Deſigns clear, we muſt repreſent in particular every one of its parts, and make different Deſigns. In a word, to regulate the diſtance of the Eye, it muſt be ſuch as to comprehend every thing entire without trouble; and to ſee and diſtinguiſh plainly all the ſmall ſtrokes. We ſhould not here have regard to ſuch as have bad Eyes, becauſe the Muſician does not ſing to the Deaf.

IV.

Establishing the Necessity of Perspective, and answering the Difficulties which are framed against this Necessity.

Before we begin the next Chapter, which contains the practical part of Perspective, let us consider what several of the most indifferent or lazy Painters are used to object; that if we should confine our selves to the rigorous Rules of *Perspective*, there are some cases, in which, instead of Figures well proportioned, we should represent them monstrous, as happens in Representations of *Architecture*, when we follow the Rules of *Perspective*. They cannot shun (say they) meeting with some things extreamly troublesome, such as the excessive lengthening of the Cornishes, of the Capitals, and of the Bases, their sudden fall, and their disorder; which happens when any one would put them in Perspective according to the Rules of Art; for as we have demonstrated, the Perspectives of lines perpendicular to the Picture tending all to the same point, which is the principal point; if it be Columns that are to be put in Perspective, and if the point of sight be elevated, the Bases of the Columns which ought to be Horizontal, must nevertheless mount excessively; and on the contrary, if

if the point of ſight be placed low, the Capitals ſeem to overturn, and fall toward the place where the point of view is.

To this I anſwer firſt, If the buſineſs of Painting were only to repreſent things to the Life, it would be no fault if they appeared maimed and deformed, if they muſt effectively appear ſo, in the Situation they are ſuppoſed to have, and in which they are painted. But as Painting is only made uſe of to pleaſe, ſo nothing ought to be painted but in a ſtate where the Eye is ſatisfied. Thus Painters correct Nature it ſelf, or chuſe only what is the fineſt and biggeſt; to this end they never chuſe a Situation, which, by following the Rules, will infallibly make their Pictures maim'd and monſtrous; that is to ſay, if they muſt appear ſo from the point from whence they ought to be ſeen. They place therefore their point of ſight, according to the poſture they would have their Work appear in; and if they mix any *Architecture* with it, they order it ſo, as nothing appears offenſive.

Secondly, If there is any thing diſagreeable in ſuch Perſpectives as are made according to the rigour of the Rules, it is occaſioned by want of Art: The *Mathematicks* alone ſuffice not to make a good Perſpective, they only ſhew us how to find certain Points, and to draw neceſſary Lines, but this is not enough; the

principal thing is, the Light and Shadows, 'tis the Colours that makes us judge of the diſtance of things, and of their Diſpoſition and Situation. So (*for inſtance*) whereas in the Draught of the Baſe of a Column, all its parts, tho' Horizontal, ſeem to elevate and mount, *Painting* can preſerve its natural appearance, in repreſenting the parts moſt diſtant from the Eye as fading, and as they would appear if they were ſeen really without the *Picture*: In which caſe they ſeem to mount and elevate on the Horizon. It is the ſame with theſe Poſtures we call maimed, which never appear but either too lively, or not faint enough. The weakening and diminution of Colours, make the principal Performances of *Painting*.

For the farther defence of this Art, which we treat of as Mathematicians, let us add, that *Pictures* or *Perſpectives* cannot have the deſired Effect, but when they are ſeen from a certain point. But we place them very ſeldom in this point, in order to be examined; neither is it poſſible to do it, when the *Pictures* are ſmall, and their Figures not of a natural bigneſs. The Baſis of the *Picture* ought to be the ground line; that is to ſay, common to the *Picture*, and the Plan on which we ſuppoſe the Spectator, and the Perſons repreſented in the *Picture*; but this is never done. For theſe *Pictures* are placed on a Table much higher than the Plan

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we ſtand on to conſider them; and as they have ſome fine ſtrokes, and ſome ſmall parts, which cannot be ſeen but near, ſo we cannot ſee them at a neceſſary diſtance; nevertheleſs becauſe they have not their natural bigneſs, they ought not to be ſeen but at a great diſtance. So if any thing in Perſpective appear deformed, that Deformity happens, becauſe the Rules of Art are not obſerved; for in Perſpectives, where the Baſes of Columns are ſeen to mount exceſſively, and the Capitals to overturn, the Point of Sight is too near; if it were at a good diſtance, the Perſpectives of the Baſes and Columns would be ſo ſmall, that the great difference betwixt the advanced part, and the remote part of the ſame Column, would not be obſervable. When we repreſent *Architecture*, or would ſhew a great Front with very high Columns, we are obliged to take our point of Sight at a conſiderable diſtance; for it is impoſſible for us to ſee a very lofty Building, and of a great extent, at one view, if we do not ſtand at a conſiderable diſtance. Therefore the ſuppoſing the Point of Sight too near, for diſcovering at one view what we repreſent, is a fault which ought not to be imputed to the Art.

It may be anſwered, That we are ſometimes obliged to it, eſpecially when we would ſhew the ſmalleſt parts of a piece of *Architecture*;

tecture; that in that caſe the Eye muſt be near, becauſe diſtance renders every thing confuſed. I anſwer, That this Conſtraint is but Imaginary, and that we ought not to deſire any thing but what is reaſonable; that if we ſuppoſe a conſiderable diſtance, the ſmall parts ought not to appear diſtinctly; and if the Edifice we repreſent, is very high, and near the *Picture*, we muſt ſhew only the foot of it, becauſe we could ſee no more, if we ſaw it effectually through the overture of the *Picture*, ſuppoſing it to be tranſparent or open. Architects, in the Deſigns they make of great Works, uſe *Perſpective* only for the general view of an entire Edifice. They make only Geometrical Repreſentations of the parts. For, once more, we cannot ſee an intire Building of a great height, and large extent, at one view.

I do not deny but there are many fine *Pictures*, in which *Perſpective* is not obſerved; it is not obſerved in ſmall *Pictures*, as I have ſaid. This Confeſſion does not deſtroy what I have eſtabliſhed, that *Perſpective* is the Foundation of *Painting*, and that a *Picture* cannot have the ſame effect as the things themſelves, if all the Rules be not obſerved. We muſt conſider the ſmall *Pictures* but as Imitations, whereas a true *Picture* is a Repreſentation, which makes the ſame Impreſſion on the Eyes, as the thing repreſented would

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do, if it were ſeen; which ought to appear in the *Picture* in its natural bigneſs, according to the ſhape it hath, and all the meaſures of that ſhape. To make an Imitation perfect, what is done in ſmall, ought in that ſmallneſs to have the ſame Proportions. Conſequently a ſmall *Picture*, which is a Reduction, that is to ſay, which is reduced from great to ſmall, tho' it be not ſeen from the point from whence it ought abſolutely to be ſeen, *i. e.* from the true point of Sight; it ought to have a point to which all bears; ſo that if this *Picture* were reduced from ſmall to great, all the Figures would appear in their natural Size, and the point of Sight would be, that where the Eye being placed, the Sight of this *Picture* would make the ſame Impreſſions on it, as the things themſelves would do if they were preſent.

'Tis the Imitation which pleaſes, and which we admire in *Painting* as well as in *Poeſy*. A Poet repreſents upon a Theatre in a ſhort ſpace of time and place, an Action, which (ſo ſpeaking) hath taken up a great deal of ground, and a conſiderable time. He is careful of the Likelihood, and all he ſays, may be done in the manner he ſays it, and in the place and time of the Repreſentation. It ought to be the ſame with *Painting*. A *Picture* is the Repreſentation of an action, which we ſuppoſe

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to be acted in the preſence of him who conſiders the *Picture*. He ought to ſee nothing that belyes this Repreſentation; it is not ſo much the Features and Colours that appear admirable, as the perfect Imitation which ſubſiſts always, whether the *Picture* be of a natural Size or not; as we take pleaſure in reading a Comedy, which can be read in leſs than an hour. Every *Picture* is an Imitation, but a ſmall *Picture* is the Imitation of an Imitation. A ſmall *Picture* cannot make the ſame impreſſion on the Senſes, but it may upon the Mind, which is charm'd with the Ingenuity of a Painter, that can ingeniouſly imitate in ſmall, what may be done in great. Now this Imitation would be imperfect, and this little *Picture* would not ſatisfie the Mind, if *Perſpective* were not obſerved in it. For as we have often ſaid, we can only paint the inſtant of an action ſeen from a certain point; in reſpect of which, the Actors have a certain determin'd Circumference. Therefore Likelihood is not obſerved in a *Picture* great or ſmall, if all be not ordered with relation to a certain point; tho' that be not the ſame in a ſmall *Picture*, where the Eye that conſiders it might be placed; but the Soul finds this point, and it is with relation to this point that it judges of the *Picture*. We may likewiſe ſay, that in a ſmall *Picture* all is intirely reduced from great

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to ſmall, and the Spectator himſelf becomes ſo ſmall, that his height doth not exceed that of the principal point above the baſe of the *Picture*. 'Tis the Ingenuity of him that imitates, which pleaſes; what we ſee is not real, and Falſehood cannot be agreeable; therefore 'tis the Likelihood, or the art of repreſenting Truth, which renders *Painting* ſo Charming; and *Painting* doth not pleaſe, but ſo far as it favours of this Art. We ſhould take no pleaſure in ſeeing a *Picture*, in which every thing were repreſented in its natural bigneſs; that is to ſay, if it were a perfect *Perſpective* made according to all the Rules; and if we were ſo deceived, as not to perceive our Error, or not to be ſenſible of its being only an Ingenious Imitation.

Inſtead of conſidering ſmall *Pictures* as a Reduction of greater, we may conſider them as the things themſelves reduced. 'Tis ſo we ought to conſider the deſigns of *Architecture*, which are contained on a leaf of Paper: We may ſuppoſe the Deſigner did not intend to repreſent the Edifice ſuch as it is; but that it is reduced to ſmaller, that he hath made a Model of it, and that 'tis only this Model he deſigned to repreſent.

Having proved *Perſpective* to be the Foundation of *Painting*, before I come to the Practice of the Art I teach here, I will firſt remove

move a thought which some may entertain, as if I pretended that my Work were sufficient to make an excellent Painter; and thereby undertake to teach what I do not know. I repeat once more, that the Science I explain, supposes a perfect knowledge of the design. By that word is understood the just Measures, the Proportions, and the external form that the Objects ought to have, which we represent in Imitation after Nature; and that with relation to the point of Sight. For according as an arm (*for instance*) is seen, so it appears to have a certain measure. 'Tis not its real measure which must be represented, but the measure it assumes by being seen from a certain point; this is what the Painters learn, who make their Exercises in Academies, designing after *Relief-work*, or from a living Model. There are Books which explain the Proportions of a Humane Body, and discover which are the finest, for Painters should not express but what is rare and fine. For my part, I only treat of *Perspective* as a Mathematician, tho' at the same time I alledge, that it is the Foundation of *Painting*.

CHAP.

CHAP. VI.

How to find the Perspective of any Object whatever, its Situation being given in regard to the Picture and the Eye.

THE Practical part of the Art of which we treat, consists in finding the *Perspective* of a given point in the Geometrical Plan, or elevated above that Plan, whose Situation is known, in regard to the *Picture*, and the Eye that is to see it. For all visible Objects whatever, are but a heap of Points; and these Points may be innumerable. It may then be ask'd, Whether it be not an infinite labour to search for them all? But the thing is not so difficult as it at first appears. To comprehend this, observe *First*, That a Line is known when its Extremities are known: So that to find the *Perspective* of a Line, we must search for the *Perspective* of its two Extremities; for as we have already demonstrated, the *Perspective* of a Line is a Line.

Secondly, Since to draw a Parallel to a given line, 'tis sufficient to know one single point through which it must pass; so to find the

per-

Perſpective of a line parallel to the *Picture*, we need only ſearch for the *Perſpective* of one point of that parallel; for we have already demonſtrated, that the *Perſpective* of a line, which is in the Geometrical Plan, and is parallel to the baſe of the *Picture*, will in the *Picture* be parallel to the ſame baſe.

Thirdly, Having the Perſpective of one point of a perpendicular on the Geometrical Plan, we have the Perſpective of the whole perpendicular; this Perſpective, as hath been proved, being perpendicular on the baſe of the *Picture*; and the Poſition of a perpendicular depending only upon a ſingle point.

Fourthly, Since the Perſpectives of Figures parallel to the *Picture*, are ſimilar to theſe Figures, the Perſpective of one of their ſides being found, it ſerves as a common Meaſure, or Scale of Reduction, with which it is eaſy to finiſh the ſame Figure in the *Picture*.

Fifthly, The Perſpective of a line in the Geometrical Plan being known, to find one parallel to it, 'tis ſufficient to know one of its points; for if theſe parallel lines be perpendicular to the *Picture*, then their Perſpectives being prolong'd, paſs through the principal point: If they be not perpendicular to the *Picture*, their Perſpectives being continued, cut the Horizontal Line in the ſame point, which is called the *Accidental point*.

So there needs no extraordinary pains to find the Perſpectives of all the points of an Object, becauſe the knowing of a few gives the reſt. In the following Problems, we muſt ſuppoſe theſe things known, to wit, the Situation of the *Picture* in regard of the Eye, and conſequently the point of Sight, or principal point, the diſtance of the Eye from that point, the remoteneſs of the Object behind the *Picture*, and all that concerns its Situation, in regard to the *Picture*.

PROBLEM I.

To find the Perſpective of a point which is in the Vertical Line of the Geometrical Plan.

B D is the Vertical Line, A the Eye, and E the Object, whereof C is the Perſpective. The diſtance between the Object and the *Picture* is D E; the Line A B or H D is the diſtance of the eye from the *Picture*; theſe diſtances are known. A H the height of the eye is likewiſe known; ſo is the Triangle A H E; raiſing then upon the point D a perpendicular, terminating at the line A E, the point C Perſpective of E is found. *Which was to be done* (*Plate* 15. *Fig.* 1.)

This is eaſily done, by tranſporting the diſtance of the eye A B, on the Horizontal

Line. Take B F equal to A B, and on the ground line mark the distance of the Object E, by taking D G equal to D E; then draw a right line from the point G to the point F, (*these are the points which in the second Chapter we have called the points of distance*) which line F G cuts the Vertical line B D at the point C Perspective of E. This is evident; for the triangle F K G is equal to the Triangle A H E, and the Triangle D C G is equal to D C E; so H D, D C :: K D, D C.

Therefore the point C may be found by Calculation; and as all the following Problems are reduced to this, when the Situation of the Objects, in relation to the *Picture*, and to the point of Sight, is known, it will be easy to make a Table of Numbers, which shall give the measures of a whole Perspective.

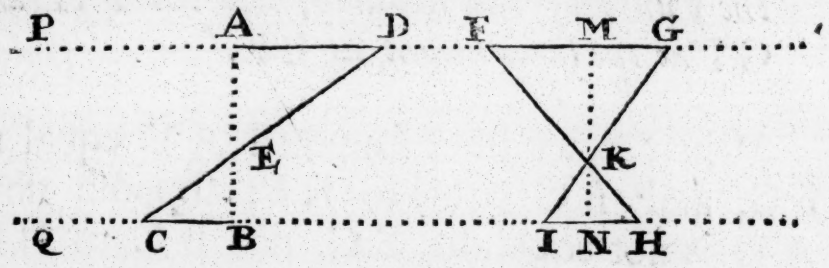
LEMMA I.

Let P *and* Q *be two parallels, between which* A B *and* M N *are perpendiculars.* A D=F G *and* B C=I H; *I say, that* D C *cuts* A B *at the same height that* G I *cuts the perpendicular* M N, *drawn through the point* K, *the Section of* F H *by* G I, *and that* B E=N K *and* A E=M K.

D E-

DEMONSTRATION.

The Triangles A E D and B E C are ſimilar, and ſo are F K G and I K H;



So B C, A D : : B E, A E,
and as I H, F G : : N K, M K,
now B C=I H and A D=F G;
therefore B E, A E : : N K, M K.

Et Componendo.

B E+A E (or A B) A E : : N K+M K (or M N) M K.

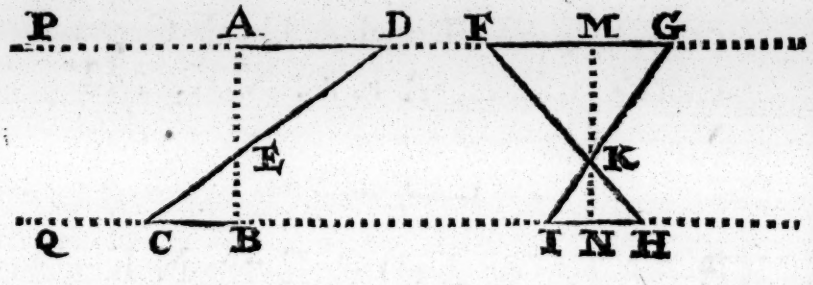
So A B, A E : : M N, M K,
and A B, M N : : A E, M K.

Now theſe two perpendiculars A B and M N are equal, being between the ſame parallels; therefore the lines A E and M K are likewiſe equal, and conſequently B E is equal to N K; which was to be demonſtrated.

LEMMA II.

Dividing the diſtances F G *and* I H *according to the ſame proportion, a line drawn through the points of this diviſion, will cut* F H *and* G I *at the ſame height as* B E.

Whereas we have ſuppoſed A D equal to F G, and B C equal to H I; ſuppoſe now A D is not equal to F G, nor B C to H I; but only that there is the ſame proportion



between theſe two lines; that is to ſay, B C, A D : : I H, F G, in that caſe the ſame will happen as in the former Lemma; that is to ſay, A B and M N will be cut at the ſame height.

DEMONSTRATION.

Becauſe the Triangles A E D and B E C are ſimilar; as likewiſe F K G and I K H; therefore B C, A D : : B E, A E, and I H, F G : : N K, M K; ſo the reaſon of

B C

BC to AD, is the same as that of IH to FG; therefore two reasons being equal to a third, they are all equal.

BE, AE :: NK, MK.

Consequently Componendo.

BE+AE (or AB) AE :: NK+MK (or MN) MK. So AB, AE :: MN, MK.

Then *Permutando.*

AB, MN :: AE, MK.

Now AB=MN; therefore AE=MK, then AB−AE=MN−MK. But AB−AE=BE, and MN−MK=NK. Therefore BE=NK. *Which was, &c.*

PROB. II.

To find the Perspective of a point, in any place whatsoever of the Geometrical Plan.

Suppose Y a point given in the Geometrical Plan, and its Situation known. Its *Incidence* on CD the base of the *Picture* X, is B, the point of sight is A; the line AO is the Section of the Vertical Plan. The distance of Y from the *Picture*, is equal to BE, which I mark on the ground line, prolong'd at discretion. The distance of the Eye is equal to AF, which I have also marked on the Horizontal

zontal Line G H, prolong'd as far as requiſite: So E and F are the points of diſtance, through which I draw the line E F, which cuts A B in a point, which is the Perſpective of Y; *which was to be demonſtrated*, (*Plate* 15. *Fig.* 2.)

Firſt, The Perſpective of Y, ought to be in the line B A, *Chap.* 4. *Theor.* 4.

Secondly, If the point Y were in the Vertical line O P, then A B would be a perpendicular.

Thirdly, Let Y be elſewhere than in the Vertical line. By the *Theor.* 19. *Chap.* 4. its Perſpective is in a parallel to the baſe of the *Picture*, to wit, in the Perſpective of Y P, which is parallel to the ſame baſe: Therefore whither Y be in the Vertical line or not, its Perſpective is in the ſame parallel, and conſequently at the ſame height. Now the diſtance of the Eye, and the diſtance of Y, is in this caſe the ſame, conſequently according to the firſt preceding Lemma, F E cuts A B, whither A B be a perpendicular or an oblique line: Therefore the Perſpective of Y, which is in A B, and in F E, will neceſſarily be in the Section of thoſe two lines.

Plate. 15

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Fig. 1.

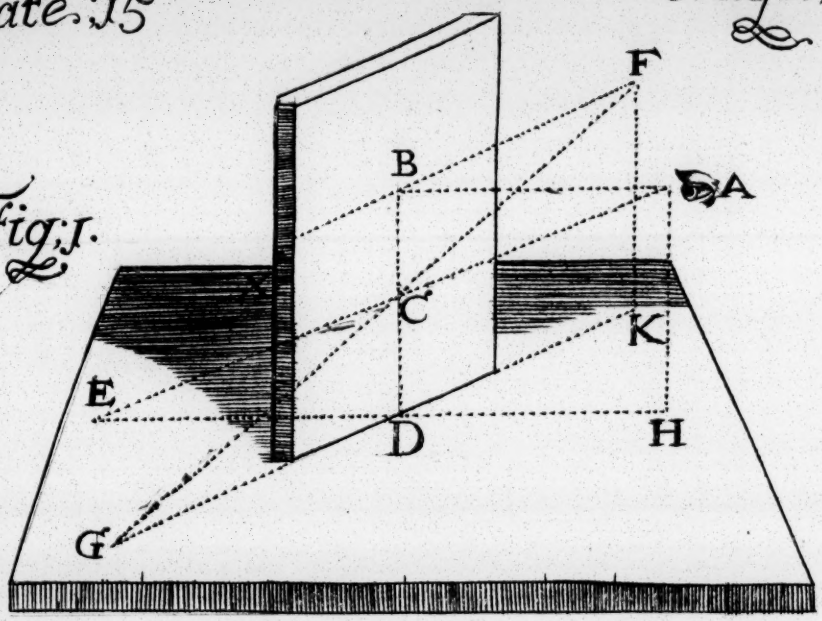
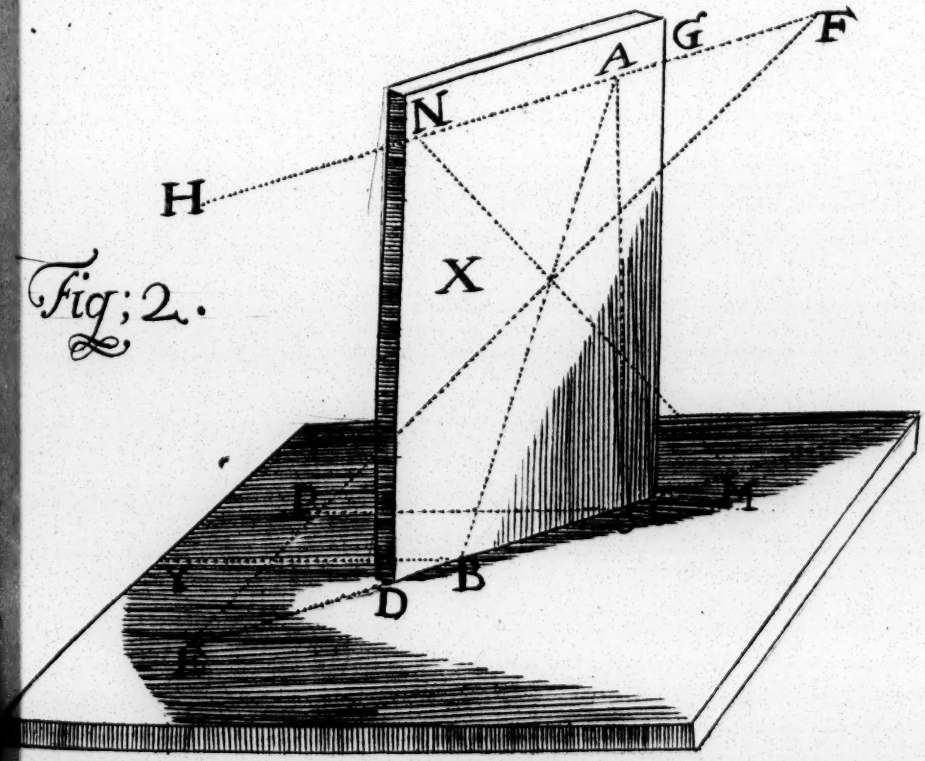


Fig. 2.



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Firſt, The point of *Incidence* B being known, there is no occaſion for drawing the line A B; for having marked A N equal to A F, and B M equal to B E, the Perſpective of Y is in F E and in M N, and conſequently in their Section.

Secondly, If the *Picture* be too narrow, and it be difficult to prolong the ground line, and the Horizontal line (which may be done nevertheleſs by applying long Rulers) we need only to diminiſh proportionably the diſtance of the eye, and of the viſible point; taking only a third or a fourth of one and the other diſtance; for then, according to the ſecond Lemma, the line A B ſhall be cut in the ſame point by F E.

Thirdly, To facilitate the Operations, they tye a ſmall ſtring to the point of ſight, which changes not; and moving it to the points of *Incidence* of all the points whoſe Perſpective is ſought, this ſtring repreſents A B. They tye likewiſe a ſtring to the diſtance of the eye which is always in the ſame point, and moving it to the points of diſtance of the viſible object, the place where it cuts the firſt ſtring, is the Perſpective look'd for. Inſtead of a ſtring, a Ruler may be applied to the

point of *Sight*, and point of *Diſtance*, and the effect will be the ſame.

PROB. III.

To find the Perſpective of a line which is in the Geometrical Plan.

I find by the preceding Problem, the Perſpectives of the two Extremities; between which I draw a line, which is the Perſpective of the line propoſed; and this Perſpective is a line, according to what hath been demonſtrated, *Chap.* 4. *Theor.* 2.

PROB. IV.

To find the Perſpective of a line which falls perpendicularly on the Picture.

Find as in the foregoing Problem, the two points, which are the two Extremities of the line propoſed, and draw a right line betwixt them; this will be the Perſpective ſought for. If it were not neceſſary to determine its greatneſs, it would be ſufficient to find the Perſpective of one of its points; for the line which contains its whole Perſpective, muſt paſs through the principal point, if prolong'd, as hath been demonſtrated, *Chap.* 4. *Theor.* 4.

PROB.

PROB. V.

To find the Perspective of several Lines parallel amongst themselves, but not to the Picture.

CASE I.

These Lines which are parallel amongst themselves, may fall perpendicularly on the *Picture*; and in this case their Perspectives are found by the preceding Problem.

CASE II.

If these Lines parallel amongst themselves, are not perpendicular to the *Picture*, the Perspective of one of them must be found by the third preceding Problem, which being prolong'd to the Horizontal line, which it will cut, as hath been proved by *Chap.* 4. *Theor.* 5. it gives the *Accidental* point, in which all the Perspectives of these parallel Lines do meet, because they all cut the Horizontal line in the same point by *Chap.* 4. *Theor.* 6. So it suffices to find the Perspective of one single point of these lines, for that gives the Perspective of every one of them. But to determine the length of these Perspectives, the Perspective of the Extremities of each of these lines must be found, if it be not found already.

PROB.

PROB. VI.

To find the Perspective of several lines parallel to the Picture.

Since the Perspective of these lines is parallel to the base of the *Picture*, *Chap.* 4. *Theor.* 3. then by finding the Perspective of one of their points, you have that of the lines. For to draw a line parallel to a right line given, it's enough to have a point through which it passes, as is shewn in the *Elements of Geometry*.

PROB. VII.

To find the Perspective of the Division of a Line.

Let C D be a line divided into three parts (see *Plate* 16. *Fig.* 1.) C H. H G, and G D; the ground line is M E, the principal point A, the point of distance of the eye is B, the points of *Incidence* of C, H, G, D are L, I, F, E. I first enquire after the Perspectives of the Extremities C and D, taking L M equal to L C, and drawing from M to the point B, the line M B, which cuts the *radial* A L in N, which is the Perspective of C. I take likewise E K equal to D E, and draw from K to B a right line which cuts A E in O; so that

that O is the Perſpective of D; conſequently N O is the Perſpective of C D. Now having drawn *radial* lines from the points of *Incidence* L, I, F, E of the parts of C D, to the principal point A, theſe *Radials* ſhall give the diviſion of N O; for the Perſpectives of the points H and G are in the line N O; and likewiſe in the *Radials* A I, A F, and conſequently in the points *p* and *q* common to N O, and to theſe *Radials*.

If we were in queſt of the diviſions of a line perpendicular to the *Picture*, as if L C were divided into three parts, then L M muſt be divided into three equal parts, and a line drawn from each point to the point B, which will give the diviſion required, for the line L N is the Perſpective of C L, which will be cut by thoſe lines in the points deſired.

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Tho' the principal point be unknown, yet the points of diſtance may be known, as in this other Figure where D and F are the points of diſtance. The point of which K is the Perſpective, is diſtant from the *Picture* the length of the line A E, (ſee *Plate* 16. *Fig.* 2.) and the point H is the Perſpective of A, which by this is on the baſe of the *Picture*.

To

To have the eight Diviſions of A K, divide A E in eight equal parts, and from each of theſe parts draw a line to F, which gives the diviſions required; for theſe lines, as well as the *Radials*, ought to cut A K in the points which are the Perſpectives of theſe points, the diſtance of which is mark'd by the diviſions of A E. The ſame muſt be done to find the diviſions of A I, dividing A C in eight equal parts; and from each of thoſe parts drawing right lines to the point D.

PROB. VIII.

To find the Perſpective of a Parallelogram divided in ſeveral Parallelograms, on the Geometrical Plan.

This Problem is eaſily reſolved by the preceding Problems, and thus abridged. Let the Parallelogram B C D E be propoſed, and divided in ſeveral other ſmall Parallelograms, (ſee *Plate* 17. *Fig.* 1.) I ſuppoſe it on a Geometrical Plan behind the *Picture*. It may be ſo placed, that all its lines ſhall be ſome of them parallel, and ſome of them perpendicular to the *Picture*, or elſe they ſhall all be oblique. This makes two Caſes.

CASE

Plate 16

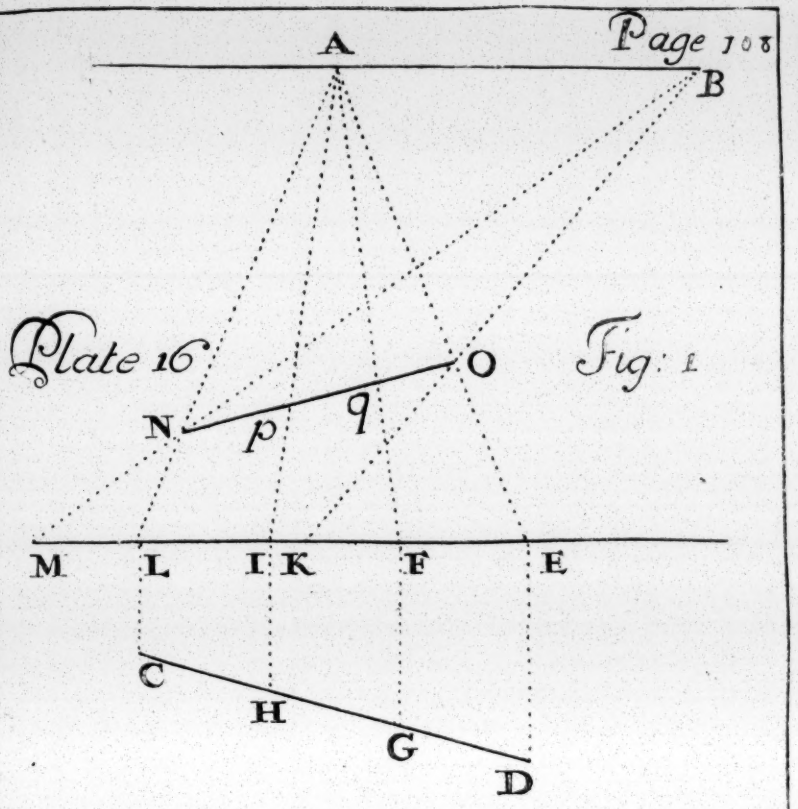

Fig: 1

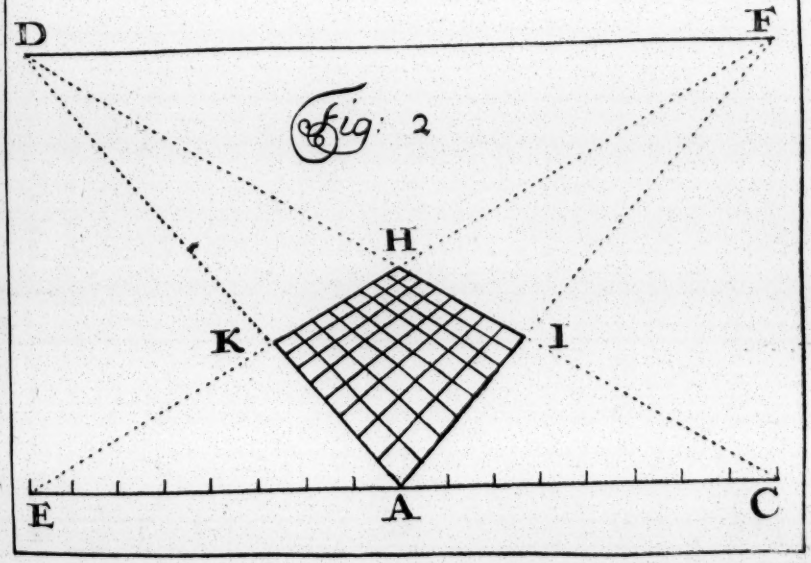

Fig: 2

CASE I.

Let B C D E be a Parallelogram. I ſuppoſe B C on the ground line or baſe of the *Picture:* The principal point A, to which I draw lines from each part of the diviſion of B C; I apply the Ruler to the points H and L which I have found, and to the *Accidental* point N, and draw betwixt H L and I K right lines: I do the ſame on the diviſions of K L, with relation to the *Accidental* point M, which gives me the figure H, I, K, L, Perſpective of A, B, C, D, and of all the Parallelograms which it incloſes.

CASE II.

Suppoſe A B C D a Parallelogram containing ſeveral others; the principal point is E, the points of diſtance are F and G; I ſearch *firſt* by the common Rules the Perſpective of the four points A, B, C, D, which I find to be H, I, K, L.

Secondly, I apply the Ruler to H I, or on L K, and marks the point N, which ſhall be one of the *Accidental* points, where all the Perſpective lines of the parallels to A D and to B C ſhall terminate. I apply likewiſe the Ruler to H L or I K, and I find the *Accidental* point M.

Thirdly,

Thirdly, I search by the foregoing Problem the Perspective of the divisions of A D and of D C: I apply the Ruler to the points of H and L which I have found, and to the *Accidental* point N, and draws straight lines between H L and I K: I do the same on the divisions of K L, with relation to the *Accidental* point M, which gives me the figure H I K L, Perspective of A B C D, and of all the Parallelograms which it incloses *which was to be done.*

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This Practice is of importance, for by it we perform, what, without its assistance, would be very difficult. In the first place it gives Painters the *Degradation* of a *Picture*: They imagine the Geometrical Plan to be a Parallelogram comprehending several lesser Parallelograms. Then they trace first the Perspective of all these Parallelograms, which is easily found by the preceding Operation. After which, as I have already observed, they have the *Degradation* of the *Picture*; and know what Diminution to give their Figures.

This Practice furnishes a short way of copying all sorts of Figures, and putting them in Perspective. To copy a Figure, inclose it in a square Frame, divided in several smaller

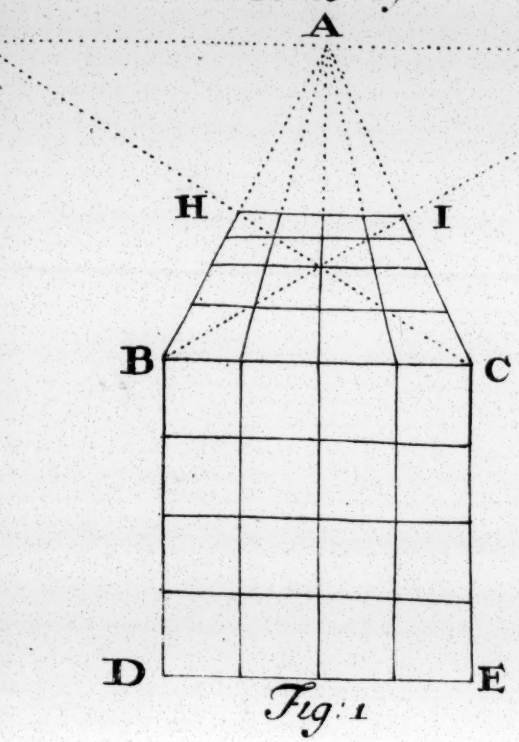
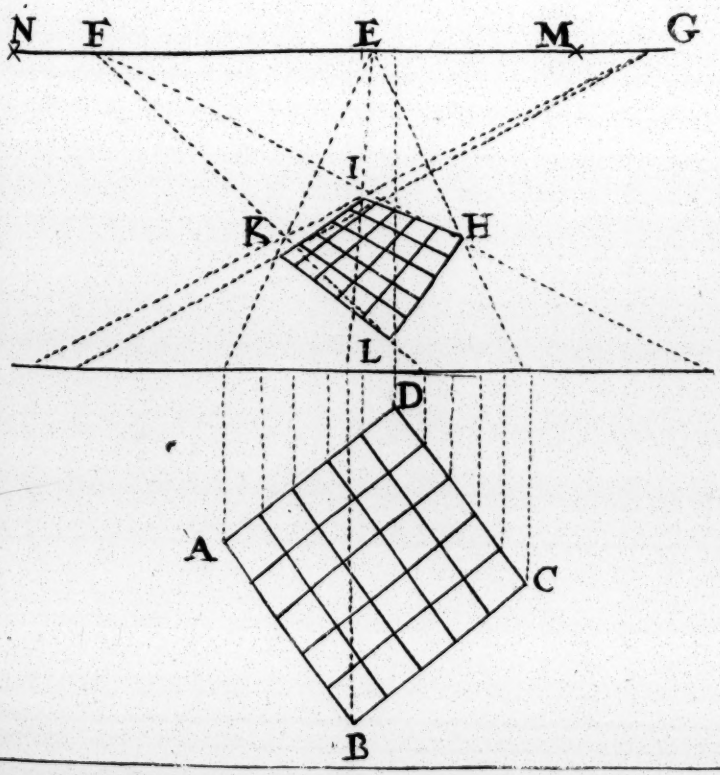


Fig: 1



smaller Squares. Then if the Copy be desired of the same bigness as the Original, make another Square equal to the former, or greater or smaller in proportion to what you desire your Copy to be; after that carry what is contained in each Square of the Original, into the Square that answers it in the Copy. This is easily comprehended. If the Square intended for the Copy, is equal to that which incloses the Original, the Figure that is copied, will be precisely alike, and equal to the Original. If it be only a third part, the Copy will be still like, but three times less. Now 'tis easy to put this Figure in Perspective, whether it be an Original or a Copy, as the following Problem will demonstrate.

PROB. IX.

To put any Plan or Figure whatever in Perspective.

The Figure must be put in a Frame, or Parallelogram, divided into lesser Parallelograms, as was said in the beginning: Then the Perspective of that Parallelogram must be found by the former Problem; and the Figure in it, placed in the Perspective of each of the small Parallelograms. As for example, it is desired to put the Plan of the Cittadel X

in Perſpective, ſee *Plate* 18. Make the Squa
A B C D, which comprehends ſeveral ſmall
Squares, theſe Squares contain the parts
the Plan of this Cittadel. Then find E F G
Perſpective of the Square A B C D, and
all its parts. This done, tranſport into t
parts of the Perſpective Plan Z, all the pa
of the Geometrical Plan X, that anſwer to i
This may be conceived eaſily by the Figure.

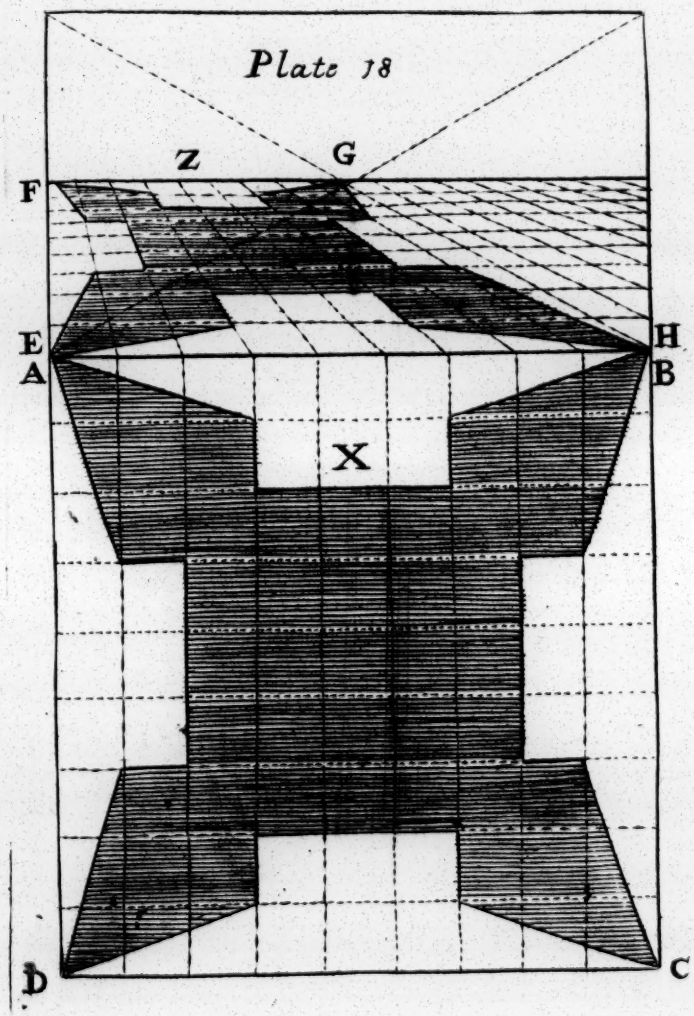
PROB. X.

To put a Circle in Perſpective.

Generally in putting any Plan Figure i
Perſpective, whither it conſiſt of right
crooked lines, the Practice muſt be as w
have ſaid. So to find the Perſpective of t
Circle X (ſee *Plate* 19. *Fig.* 1.) after havi
incloſed it in the Square B C D E, and divide
the Square as you ſee, ſearch for Z Pe
ſpective of this Figure; which being foun
draw the crooked line Z through the poin
where the Perſpectives of the right lines tha
cut the Circle X cut one another; an
this Z is the Perſpective of X *which w*
deſired.

PROB

Plate 18



PROB. XI.

To find the Perſpective of a point in the Air over the Geometrical Plan, ſuch as Y.

Firſt, Find its point of *Seat*, and the point of *Incidence* of this Seat: I ſuppoſe the point of *Seat* to be in the line K B, of which B is the point of *Incidence*, (ſee *Plate* 19. *Fig.* 2.) I erect on B the perpendicular B C of the height of Y. After which, having drawn a line from C to the point of ſight A, I ſay the Perſpective of Y muſt be in the line A C; for having drawn a perdendicular from Y to the *Picture* X, its point of *Incidence* is C; now the Perſpective of the line Y C is in the line A C; therefore the Perſpective of Y is ſome point of the line A C, ſuch as *g*.

Secondly, To find which point of A C is the Perſpective of Y, find by the ſecond Problem the Perſpective of K the foot of Y K; I ſuppoſe it to be *d*; then I erect on this point a perpendicular which ſhall cut A C, in *g* the Perſpective of Y; for it is in A C as we have ſeen, and that Perſpective muſt be in *d g* according to *Chap.* 4. *Theor.* 7.

PROB. XII.

To find the Perspective of Y K *a perpendicular on the Geometrical Plan.*

This Problem is the same with the former; for to find the point Y, its Seat K must be found, and consequently the perpendicular Y K, of which *d g* is the Perspective, *(same Fig.)*

PROB. XIII.

To find the Perspective of several perpendicular Lines.

The *Vertical* or perpendicular B C being found, it remains only to find the points of *Seat* of the perpendiculars given: I suppose the points to be H, L, K, their Perspectives are *a*, *b*, *d*; from these points draw parallel lines between A B and A C, as hath been shewn, *Chap.* 4. *Theor.* 10. *(see Plate* 19. *Fig.* 2.*)*

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It is easy to find by Calculation all these perpendicular Perspectives, or the Perspective greatness of lines which are perpendicular on the Geometrical Plan; for in the Tri-

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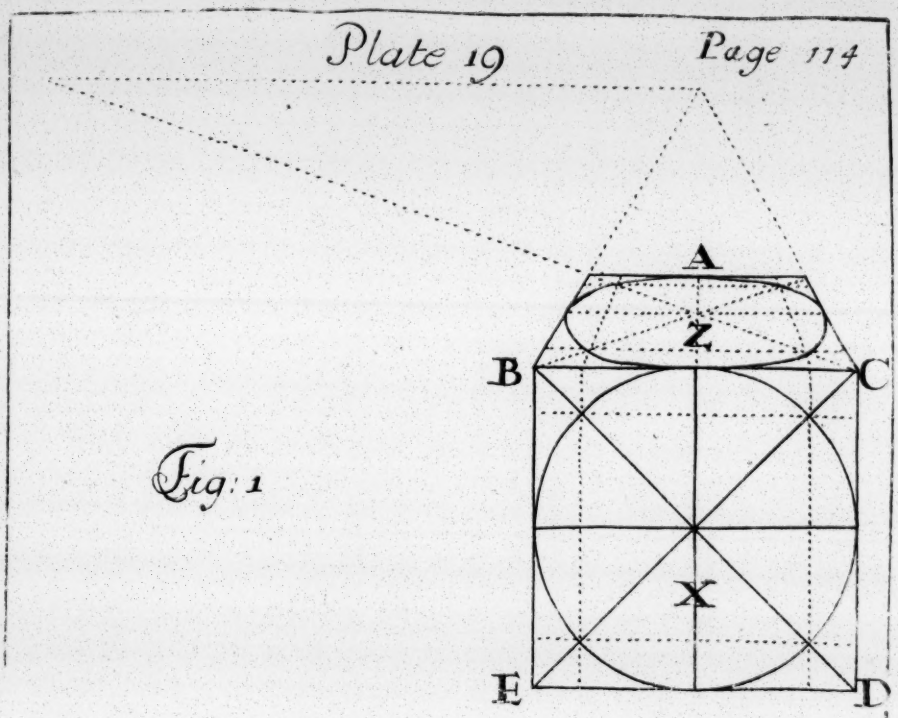


Fig: 1

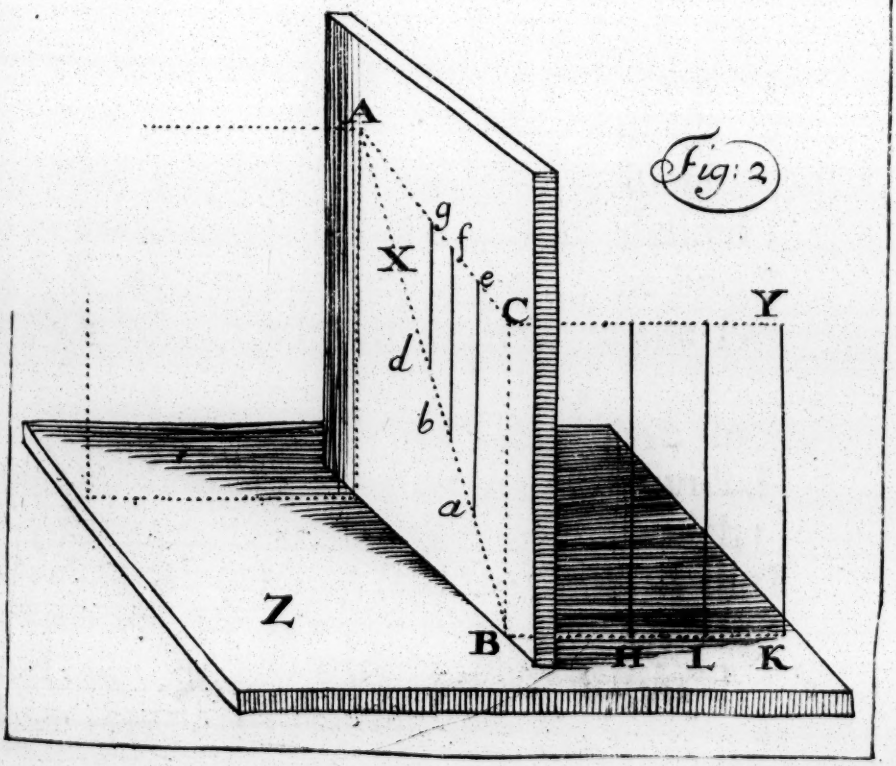
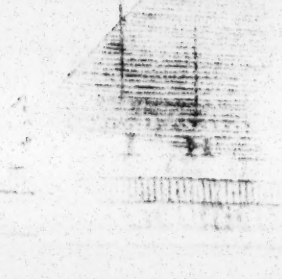


Fig: 2



angle A B C as B C, *a e*, *b f*, *d g*, are parallel, ſo they are proportional; ſo that knowing B C to be equal to Y K, you have the length of *a e* for A B, B C :: A *a*, *a e*, (*ſame Fig.*)

It is as eaſie to make a Scale for the Perſpective as for the Geometrical Repreſentations; which Scale gives all the Meaſures the parts of a *Picture* ought to have. Perſpective Scales are called *Fleeing*, as we have ſaid, becauſe that whereas all parts of a Geometrical Scale are equal, thoſe of Perſpective decreaſe gradually. To have all their Diviſions, make a common Scale in a Geometrical Plan; that is to ſay, divide into equal parts one of the lines of that Plan, which makes a right angle with the *Picture*, or is perpendicular on it: Then find the Perſpective of that line and its diviſions; and that Perſpective will be the Scale deſired; as if B K were a Geometrical Scale, the line B A, which is its Perſpective, will be the *Fleeing Scale.*

We have ſeen that the Perſpective lines of lines parallel to the Picture are divided in the ſame proportion as the lines of which they are Perſpectives. A Scale in front, is the line which marks this proportion: 'Tis eaſy to find this proportion, and conſequently the Scale is eaſily made.

This done, 'tis eaſy to make a Scheme of the whole Compoſition of a *Picture:* We may find by Calculation, as we have ſaid before, the ſize of all the lines which meaſure the Objects that are to be repreſented, and conſequently the meaſure of all its parts. They may be expreſs'd by numbers, as an Architect does of a Building, of which he is forming the Deſign.

PROB. XIV.

To put in Perſpective the Pilaſter X *and* Z, *parallel to the Picture.*

Put firſt in Perſpective, the Geometrical Plan of the baſes of theſe *Pilaſters:* So A being the Geometrical Plan of each baſe, their Perſpectives (ſee *Plate* 20.) *a b c d*, *e f g h*, *i n o p*, muſt be found. The Operation is ſhort, for according to *Chap.* 4. *Theor.* 3. all that is in the Geometrical Plan upon the ſame parallel with the *Picture*, ought to be in the ſame parallel in the *Picture:* Having thus found the Perſpective of *a b c d*, the other Perſpectives of the baſes are found, by drawing parallels to the baſe of the *Picture*, and lines to the principal point, as the Figure it ſelf ſhews.

To

To finish the Perspective, we must raise perpendiculars on all those points which are the Perspectives of the points in the Geometrical Plan, on which are raised the sides of the *Pilasters*.

ADVERTISEMENT.

Observe that all these Perspective bases are equal, that *a b c d* is equal to *e f g h*, for the Triangles *a b c* and *e f g* being betwixt the same parallels, and on equal bases, to wit, *a b* and *e f*, are equal. It is the same with the Triangles *a c d* and *e g h*, which are likewise betwixt the same parallels, and on equal bases *d c* and *g h*; for according to *Chap.* 4. *Theor.* 11. the Perspectives of the equal parts of a line parallel to the *Picture*, are equal.

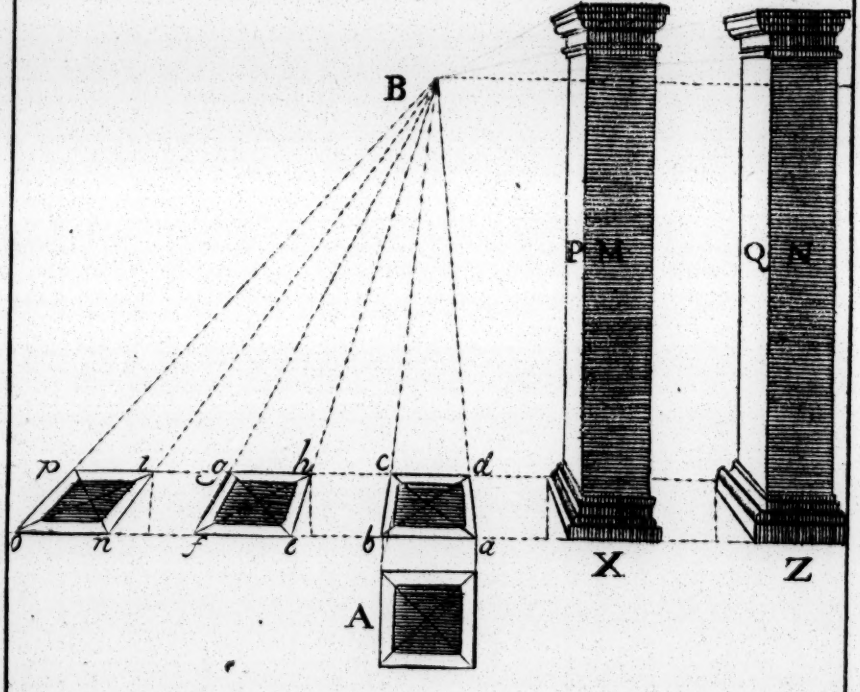
The sides of these bases which are in the same line parallel to the Picture, as *o n*, *e f*, *a b*, are equal; but the sides which are in the *Radials*, or in the lines which terminate at the principal point, are unequal; the line *n i* is longer than *e h*, and *e h* is longer than *a d*.

So that as a *Pilaster* is remote from the principal point, the side of its base augments, which is the reason that the face of the *Pilaster*, which is raised on that side, augments and

becomes larger, and infinite, if its diſtance were infinite. This is what makes a Perſpective deformed, when a great number of *Pilaſters* are repreſented on the ſame line parallel to the *Picture*; for the *Pilaſters* which are at the extremity, ſhould have their faces on thoſe ſides which are in the *Radials*; and much larger.

In the two *Pilaſters* X and Z,(ſee *Plate* 20.) the faces of the front M and N are equal; but the face Q of the *Pilaſter* Z which is the remoteſt, is greater than the face P of the *Pilaſter* X which is nearer the Eye. This inequality is offenſive; but to avoid it, we ſhould not put too great a number of *Pilaſters* on the ſame line parallel to the *Picture*. It is likewiſe impoſſible that the Eye can diſcover at one view, an intire row of *Pilaſters* all parallel, if it be not at a great diſtance; and then all theſe *Pilaſters* are found to be very near the principal point; and become ſo confuſed, that their inequality is not ſeen.

All Pictures ought to be limited, as we have ſaid before, becauſe they ought to be ſeen at one view. It would be impoſſible to ſee thoſe parts which are too remote from the principal point; for the Rayes that ſhould come from thence to the Eye, could not enter it. Such as take right Methods, never make Pictures, or Perſpectives, in which any thing


B
P M
Q N
p
i
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A
X
Z

thing ſhall appear monſtrous or irregular. If the ſubject be vaſt, they ſuppoſe it at a great diſtance, and then all its parts come near enough to the principal point; and become ſo faint, that we are not ſenſible of the irregularity we ſpeak of. Beſides that, according to the Rules of *Painting*, as what is directly oppoſite to the Eye ſtrikes it more lively, ſo we generally colour it more, and by conſequence we darken what is remoteſt from the principal point. Now this darkening regulates the bigneſs, and is the reaſon why the irregularity is not ſo perceptible. When a long Hiſtory is to be painted to adorn a Gallery, as *Poets* divide their matter in different Books, ſo *Painters* ſhould diſtribute this Hiſtory in different Pictures, having each of them their point of ſight.

PROB. XV.

To put in Perſpective Columns which are parallel to the Picture.

Suppoſe X to be the Plan of each of theſe *Columns:* We muſt put in Perſpective all their baſes, that is to ſay, their Geometrical Plan, as the figure ſhews, (*Plate* 21.) The difficulty is, to determine on what points of theſe baſes we ſhould raiſe perpendiculars to incloſe the viſible parts of theſe *Columns.*

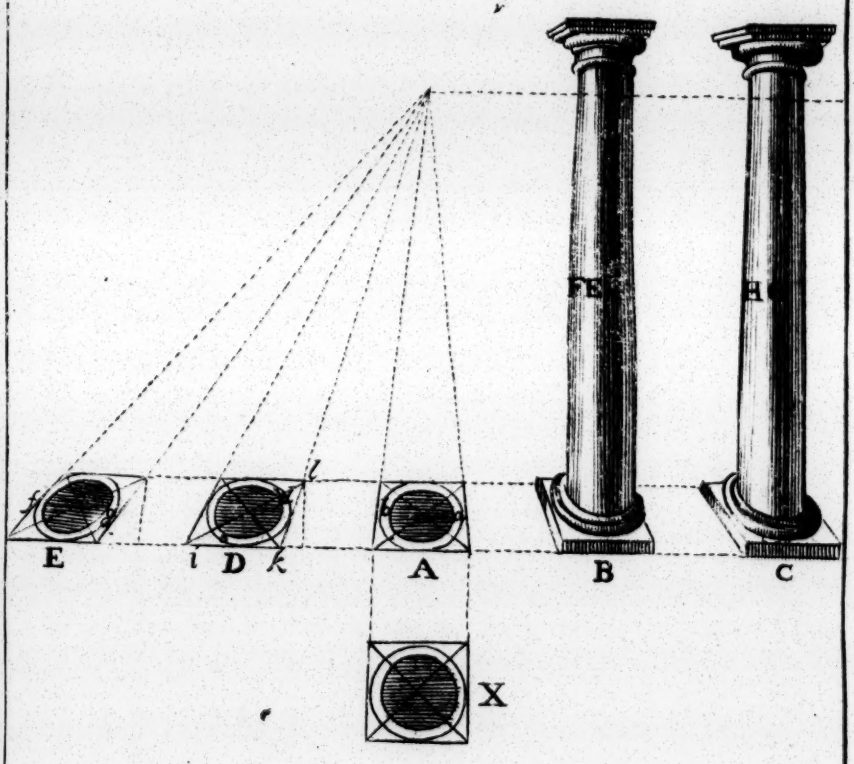
Firſt, For the *Column* A which is oppoſite to the Eye, it is evident, that having drawn *a b* the Diameter parallel to the Picture, it is on the points *a* and *b* that we muſt raiſe theſe perpendiculars. So the viſible part of the *Column* will fall upon the portion *a b c*.

Secondly, In a *Column* we can only ſee what is betwixt the viſual Rayes which touch it, that is to ſay, the Rayes which are as *Tangents* to the Column. We ſee different parts according as we change our ſituation; or as the Perſpective becomes more diſtant from the principal point. So that we ſhould be deceiv'd, if on the baſe of the *Column* E, we raiſed the ſides of the ſaid *Column* upon the extremities *f* and *g* of the diameter *f g* parallel to the Picture; as if in that ſituation, the ſame viſible part of E were alike to that of A.

Thirdly, What muſt then be done? If we raiſe a *Pilaſter* on D, we ſhall ſee two faces raiſed on *i k* and *k l*. Now a *Column* is a *Pilaſter* whoſe angles are cut off; ſo it is upon the points *d* and *o* where the Diagonal cuts the Circle (or Perſpective of the Circle) which is the baſe of the *Column*, that we muſt raiſe the perpendiculars, and we ſhall ſee, that by this Rule we repreſent only that part of the *Column* which is viſible.

ADVER-

Plate 21



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According to what we have ſaid, *Columns* are *Pilaſters* whoſe angles are taken away. We may then diſtinguiſh in each viſible part of a *Column*, two parts that anſwer to the two faces of a *Pilaſter*, as in the *Columns* B and C, F and H anſwers to the face which is in front, and E and G to that which is on the ſide. The parts F and H are always equal, but E and G unequal, as we have ſhewn in *Pilaſters*. This is the reaſon why *Columns* parallel to the *Picture*, when they are remote from the principal point, ought to appear more groſs, which makes a bad proſpect; becauſe if their diſtance were infinite, they muſt be infinitely groſs; but this never happens, for the Eye, continuing fixed on a certain point of ſight, cannot ſee to the right and to the left, but in a limited extent, unleſs the Eye be infinitely diſtant; and then all the *Columns* being confuſed, the exceſs of the one half above the other in their Perſpective, cannot be ſenſible.

PROB. XVI.

To put in Perſpective a Gallery adorned with Pilaſters and Columns.

The firſt thing to be done, is to put the *Ichnography* or Plan of this Gallery in Perſpective; and if they be *Pilaſters* to raiſe perpendiculars

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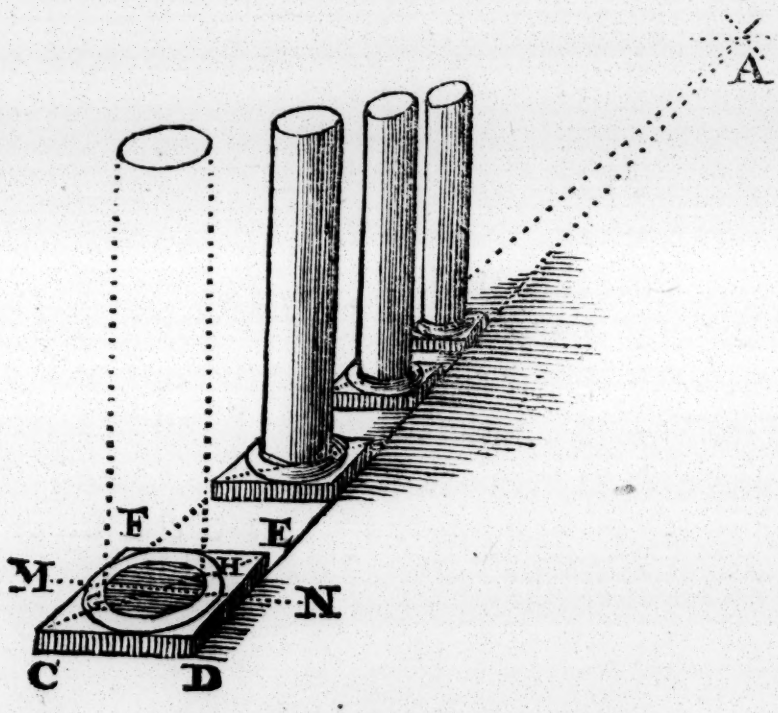
pendiculars on the Plans of their bases, as we did in the 13th Problem. But if they be *Columns*, we must mark the Squares which incloses their bases as here C D E F; and having drawn the Diagonal C E, raise two perpendiculars on the points G and H, where this Diagonal cuts the crooked line, which is the Perspective of the foot of the *Column*; as we have told in the foregoing Problem; and as the Figure will give you to understand.



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I do not believe it is possible to find surer and exacter Methods of Practice; I say *more exact*, because I allow this not to be altogether such. It supposes the Eye to see always the

the half of a *Column*, which is not true. If the *Column* be large, the two Rayes which touch the crooked line G H G in the points G and H, cannot reunite in the ſame point, to wit, the Eye. Neither is it true that the two perpendiculars which incloſe the *Column*, ought to be raiſed on the points of the baſe, where a Diameter parallel to C D, ſuch as M N, cuts this baſe; for it is evident, that 'tis not that part of the *Column* which is ſeen, when the point of ſight is in A.

PROB. XVII.

To put a ſucceſſion of Pillars, or Statues, in Perſpective, or a Row or Alley of Trees.

The Plan muſt firſt be put in Perſpective. If all theſe Trees and Terms are equal, and the Statues alike, all we have to do, is to diminiſh them in proportion to their diſtance. Now we have already ſhewn, that it is eaſie to find the Perſpective bigneſs of an Object; ſo when a Painter knows, that where he places a certain Figure, it ought (*for inſtance*) to be a fourth part leſs, than if he placed it on the fore part of the *Picture*; there is no doubt but he muſt make it a fourth part leſs. It is the ſame with a Term or a Tree. All Books of Perſpective are full of Figures, ſhewing how to practice the Problems which are here propoſed.

PROB.

PROB. XVIII.

To put a hollow body in Perſpective.

Every body, of whatever Figure, is incloſed by the lines which meaſure it, and certain principal points which terminate its Figure. So to put in Perſpective a body of any ſort of Figure, we need only to find the Perſpectives of its principal lines and points. I ſuppoſe its ſituation, in reſpect to the *Picture*, to be known: To put the hollow body X in Perſpective; this body is comprehended between eight faces, ſuch as A B C D; its hight is A B; the figure of its bottom is A E F G H D; that of its overture is B C I K alike and ſimilar (ſee *Plate* 22. *Fig.* 1.) To put then this hollow body in Perſpective, we muſt *Firſt* find the Perſpective of A E F G H D, then the Perſpective of the perpendiculars A B and D C, and of the others which meaſure the height of X, and by joyning their tops, we have the Perſpective of X, as is evident; but that the Perſpective may have its effect, and that X may appear hollow, it muſt be ſhadowed as you ſee. The Figure alone is ſufficient to make us comprehend how to put the body Z in Perſpective (ſee *Plate* 22. *Fig.* 2.) We muſt find the Perſpective of its Plan, and of its principal lines, and then ſhadow the parts which are not expoſed to the light, as we ſee in the Figure.

PROB.

Plate 22

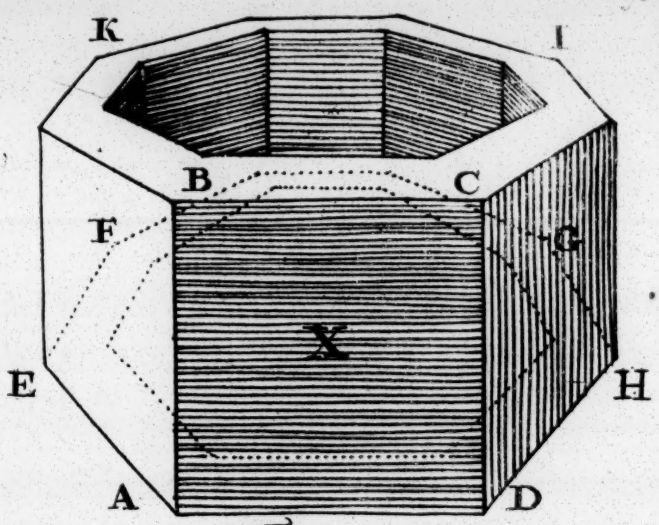
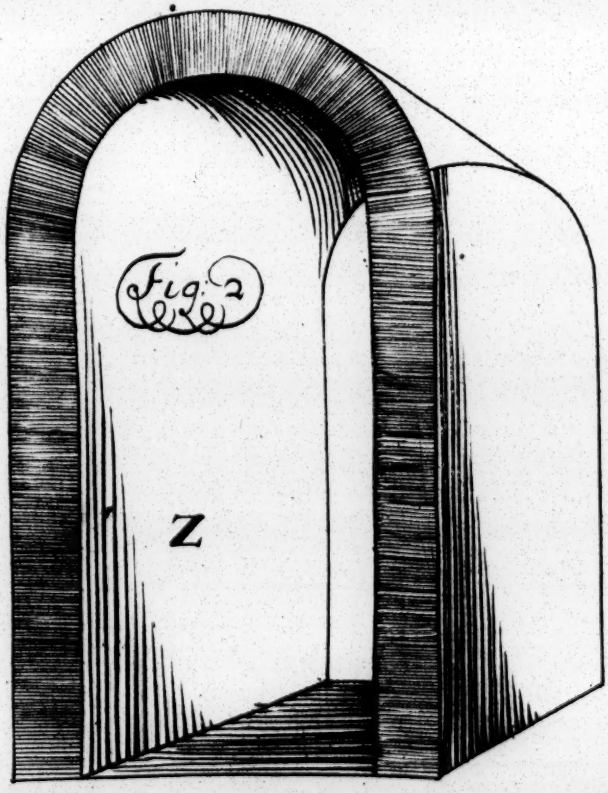


Fig: 1



PROB. XIX.

How to put all ſorts of Objects in Perſpective.

Perſpective, as we have already ſaid, teacheth not how to Deſign, how to paint Men, Beaſts, Trees, and *Architecture*; all we ought to expect from a Treatiſe of Perſpective, is to know how to put the principal points of an Object, and the principal lines which ſhew its Dimenſions, in Perſpective. The reſt is the buſineſs of a *Painter*, or of one who can Deſign. So that if it be a piece of *Architecture* which we would put in *Perſpective*, after having agreed on the place it is to have in the *Picture*, and on its largeneſs, if we underſtand not *Architecture*, we muſt employ one that knows how to deſign it; or if it be a Figure, we muſt imploy a *Painter* who knows the deſign.

CHAP. VII.

Of Pictures which are not perpendicular on the Geometrical Plan; which are inclined or parallel to the Horizon; which are ſloping in reſpect of the Eye; and laſtly, of thoſe which reſt on an unequal and irregular ground.

HItherto we have ſuppoſed the ground of the *Picture* level and plain; and placed Vertically, that is to ſay, perpendicular on the Horizon, and ſeen in front. Let us ſee what is to be obſerved in all the other ſituations it may be ſuppoſed to have; whether it be on a Plan, or on a place *Concave* or *Convex*, in a *Ceiling*, or in a *Vault*, on a Wall in which there are Cavities, and *Sallying* or *Re-entring* Angles, or on an unequal and irregular Ground. All this requires no other Rules than thoſe we have already propoſed; but it is neceſſary to be well underſtood.

What-

Whatever be the ſituation of a *Picture*, or whatever its ground be, 'tis eaſy to make appear there, whatever is poſſible to be repreſented in a common *Picture*, in following ſtill the ſame Rules. The ſituation of a *Picture*, whatever it be, may be eaſily reduced to that of a *Vertical Picture*. To that end we muſt ſuppoſe the difference to be in the ſituation of the Spectator. As if *(for inſtance)* the Picture be parallel to the Horizon, we need only ſuppoſe the Spectator, not to be ſtanding, but lying upon the ground, and conſequently parallel to the Horizon; and then the Picture hath its ordinary ſituation with reſpect to the Spectator. We have ſhewn, that bodies Concave, Convex, or Rugged, if ſeen from a-far, appear flat and even; that the greateſt parts appear ſmall; and ſo conſequently thoſe that are unequal, may have the ſame appearance as if they were all equal. We may then divide an uneven ground of any figure, ſo as to make it appear even, and compoſed of equal parts. Conſequently if we there paint things according to the extent of the place, that is to ſay, making that to be greater that is in a greater place; if we paint two different parts of a Man, that are equal, as *(for inſtance)* the two Eyes in two places of a different bigneſs, this Painting, which if ſeen near, would appear

pear deformed and without proportion, yet if ſeen from a-far, may have an agreeable appearance; becauſe what is unequal appears equal; and ſo theſe two Eyes unequal in the place where they are painted, ſhall have an equal appearance.

A general expedient, for ſucceeding in all the ſorts of Painting we ſpeak of in this Chapter, and for doing things eaſily, is to make a *Picture* on an even ground perpendicular to the Horizon, and ſuch as we would have that appear which is painted on a ground that is not ſo, or that hath not an ordinary ſituation. There is a neceſſity of making this firſt Picture, even then when we undertake to work on a level ground, which hath nevertheleſs inconvenient ſituations, in which it is difficult to take all its meaſures. I do not except even the Vertical Pictures; if it ought to be placed much above the Eye, apply'd to a Wall, and ſeen at a diſtance, in which it will not be neceſſary to raiſe the Eyes too much, nor to turn the Head backwards to conſider it; for then the point of ſight would be much lower than the Picture; and ſo the performance would be very troubleſom. Now to avoid what difficulty may happen in this caſe, make a rude draught or model in ſmall, of the great *Picture* which is to be work'd.

This

This may be eaſily underſtood; for to make this Model, give the Cloath the ſame meaſures as you give to the great *Picture*, only reduced; that is to ſay, ſuppoſing (*for inſtance*) that the true Picture ought to be of 2 foot; and that the principal point ſhould be as many feet below the baſe of the Picture, take the Cloath of 20 Inches, and place the principal point 20 Inches below this Cloath. There we paint the rude draught or model of the great Picture: We divide this rude draught into ſmall Squares, and likewiſe the Cloath of the great Picture; then there is no difficulty, but to repreſent in each of theſe Squares, what anſwers to it in ſuch or ſuch a Square of the Model. This being done, the great *Picture* hath the deſir'd effect.

I.

Of Pictures that are inclining or leaning.

This ſituation requires no new Rules. We muſt do the ſame as if the Picture were perpendicular to the Horizon. X is a Picture inclin'd on the Horizon Z, the point of ſtation is B, and B *a* the height of the Eye. Suppoſe the line B A parallel to the Picture X, and equal to B *a*; that is to ſay, we muſt imagine that B being ſtill the point of ſtation, the Spectator inclines himſelf and becomes parallel to the *Picture*. Then A C is the height

of the Eye, which is ſituated at the point A. I ſuppoſe A D parallel to the Horizon, or to B C; ſo D is the principal point, or point of ſight, and C D is the Vertical line, (ſee *Plate* 23.) Theſe things being ſuppoſed, if E be the viſible point, 'tis evident that its Perſpective will be F. If the Picture X were not fix'd, that ſo we could ſet it upright, and that the line A B became perpendicular on the Plan *Z*: Then in this new ſituation the point A would be the ſame as *a*, and D the ſame as the point *d*. It remains to prove, that the Perſpective of E will, after this change, be in the ſame point of the *Picture* X. That is to ſay, that as C D would be the ſame line as C *d*, ſo C *f* would be the ſame line as C F.

A D and *a d* are parallel to B E, and *a d*=A D.
So the Triangles *a f d* and C *f* E are ſimilar.

Therefore *a d*, C E :: *d f*, *f* C.
The Triangles A D F and C F E
are likewiſe ſimilar.
So A D, C E :: D F, F C,
a d, C E :: *d f*, *f* C.
Now *a d*,=A D, and C E=C E:
Then A D, C E :: $\frac{d f,\ f C}{D F,\ F C.}$
Conſequently *d f*, *f* C :: D F, F C.
So *d f*+*f* C, *f* C :: D F+F C, F C.
But *d f*+*f* C=D F+F C. And conſequently F C=*f* C; *which was*, &c.

Thus

Page 130

Plate. 23

Thus we ſee what is to be done when the Picture is inclin'd in regard of the Eye. If the Picture propoſed is X, and the Eye that muſt ſee it be in A, we muſt imagine a parallel to the Vertical line C D, which parallel paſſes through A the place of the Eye. This parallel is A B. On the point B where this parallel cuts the Horizon Z, we muſt raiſe the perpendicular B *a* equal to B A. Then there will ſtill be the ſame point of ſight, which will be D or *d*: So we muſt draw on this Picture the Perſpectives of the Objects propoſed, according to the Rules which are given for ſuch Pictures as are perpendicular on the Geometrical Plan. Then giving to the Picture X its firſt Inclination, and placing the Eye again at A, the Perſpective will anſwer our expectation; that is to ſay, the Picture will have the appearance which it ought to have in that ſituation, the Eye being placed at the point A, and the viſible Objects having the ſame diſpoſition in regard to the point A.

II.

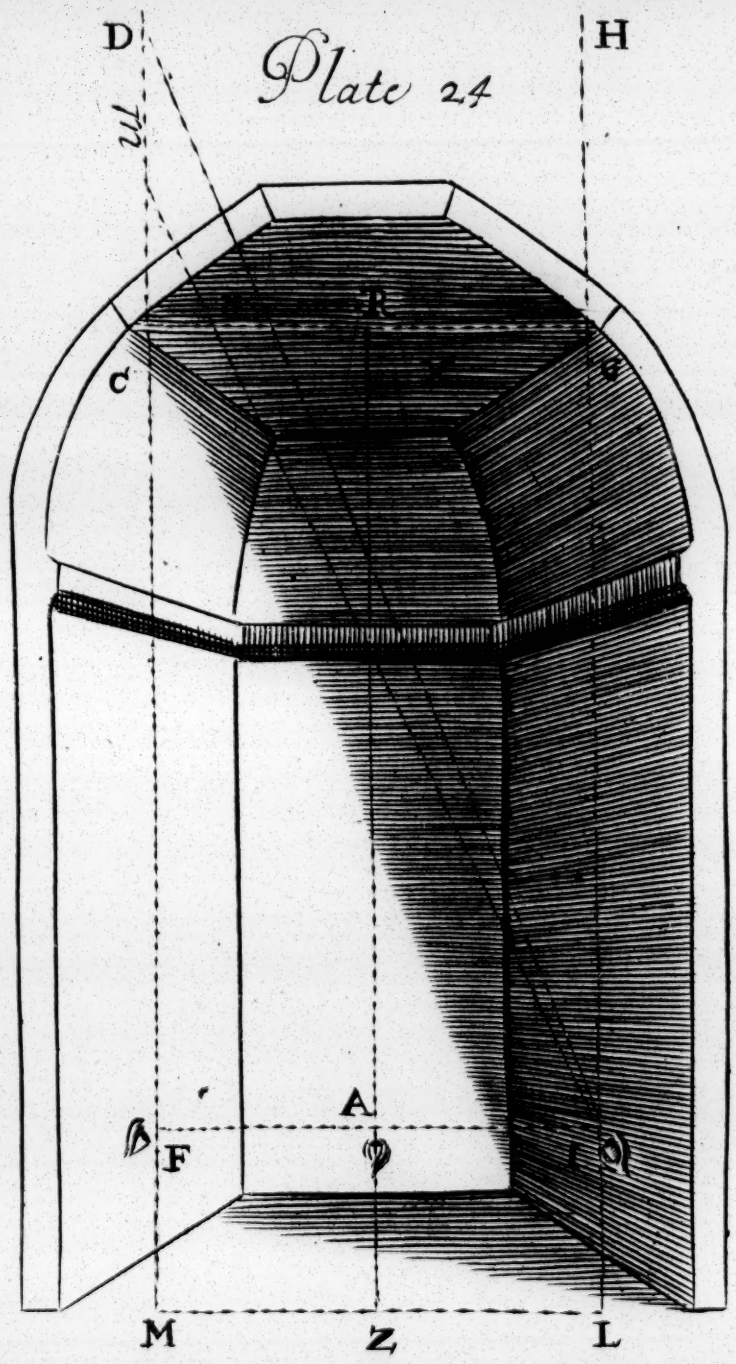
Of Pictures parallel to the Horizon.

'Tis the ſame thing whether theſe Pictures be ſeen from low to high, as when they are in the *Ceiling* of a Hall; or from high to low,

as if they were in the *Pavement* of a Church, and were ſeen from ſome Gallery. There is nothing particular for ſuch Pictures, the Rules are the ſame. Suppoſe Z the Horizon, and X a Picture parallel to it, placed in the Ceiling, A is the Eye, and ſo B is the point of ſight, ſuppoſing the Eye placed under the Center of the Picture. But becauſe in ſuch a ſituation we are obliged to turn our heads quite back, which is uneaſy, it is more natural to retire from under the Center of the Picture, and then B is no more the point of ſight. If the Eye be placed in I, the point of ſight will be in G. Suppoſe then *m* to be the viſible Object, the line D M may be conſidered as the Geometrical Plan on which is the line D *m*. The height of the Eye above the Horizon is I L; but its height above the Geometrical Plan M D, is I F, and its diſtance from the Picture X, is I G. This Picture X is perpendicular on L H; and ſo this ſituation, as we conceive it differs nothing from the ordinary ſituation, there is therefore no occaſion for new Rules to work upon a Picture parallel to the Horizon. It is evident that the Perſpective of *m* is *n*, which is found after the ſame manner, as if the Picture were perpendicular on the Horizon.

When theſe Pictures, which are ſituated parallel to the Horizon, are round, or when they

Plate 24



they repreſent a *Cylindrick* body, or *Polygon*, if the point of ſight be not at the Center of the Picture, we muſt chuſe almoſt as many different points of ſight, as the Polygon hath ſides; becauſe in ſuch a caſe the Eye changes its place, to conſider the different faces which are raiſed on each of the ſides of the Polygon. For 'tis evident, that to the end the Eye may ſee an Object which ſhould be in the line G H, it muſt be placed in F, and then L H repreſents the Geometrical Plan, F is the ſituation of the Eye, and the letter C marks the point of ſight.

In the Ceiling of a Room, the point of ſight ought to be in a place which may be eaſily ſeen, and conſequently near the moſt conſiderable Door, to the end that the Painting in the Ceiling may be ſeen from the entry, inviting, as it were, to enter farther, and find out the place from whence it may be ſeen with moſt advantage; that is to ſay, from whence the Figures appear in an agreeable proportion.

If the Ceiling were not even, but like the top of a Coach, we may then repreſent in it ſeveral Objects, or different Complications of Pictures, having each their point of ſight; for it is not poſſible that the Eye, in whatſoever place it may be ſituated, can at a view comprehend the whole Painting of

a Ceiling. Therefore it muſt change place; and conſequently we ought to ſuppoſe ſeveral poinrs of ſight; but all theſe pieces of Painting ought to have a relation, and form by a certain union one ſubject by which the whole Painting is joyn'd. When a Ceiling is only painted with Ornaments, there is no occaſion for Perſpective, Geometry is ſufficient; that is to ſay, we muſt draw each Ornament in its juſt Meaſures, as if the Eye were exactly oppoſite to it.

III.

Of Pictures that ſtand ſideways in reſpect of the Eye.

A Picture is ſaid to ſtand ſideways in reſpect of the Eye, when it is not oppoſite in front. We may conſider it in this ſituation as if it were inclin'd (ſee *Plate* 25.) The Picture X is ſideways in reſpect of the Eye A; it is inclin'd on the wall Y, which we may conſider as the Geometrical Plan. So that this ſituation is the ſame with that of which we ſpoke in the firſt Article of this Chapter, and needs no other Rule.

IV.

Of Pictures upon Concave and Convex bodies, or on ſuch as have Cavities and Eminences.

Such Pictures ought to be ſeen only at a great diſtance, to the end that the Concavity or Convexity of the ground on which they are painted, and the Eminencies and Cavities which are there may not be ſenſible, becauſe of the great diſtance; and conſequently that the ground may appear equal and flat: And then the parts of ſuch a Picture ſeen at a diſtance, appear not what they really are: Thoſe that are great appear ſmall; therefore what is here painted, ought to have quite different Features, from what is drawn in a level Picture ſeen at a ſmall diſtance.

The ſame happens in all ſorts of Pictures, which are ſeen ſideways and at a conſiderable diſtance. Suppoſe (*for inſtance*) the wall Y to be a Picture (ſee *Plate* 25.) The Eye is in the point A at a diſtance, which I could not here repreſent ſo great as it ought to be imagined. The Picture Y hath unequal parts; *a* is leſs than *b*, *b* is leſs than *c*, and *c* is leſs than *d*. Yet theſe parts ſeen from A may appear equal, and have the ſame appearance as the Picture X. So that inſtead of repreſenting a Head in the Picture X, where all its

parts muſt be done in a natural proportion, as (*for inſtance*) the Eye muſt be equal: In the Picture Y, the Eye which is in *d*, ought to be ſo much greater than the other Eye, as this other is in a place whoſe appearance is leſſer. The Figure gives a ſufficient Idea of this matter here.

In this ſituation, and generally in all others where Painting is to be done on irregular bodies, and which ought to be ſeen from far, we muſt make a Model of what we would repreſent; that is to ſay, we muſt paint upon a Picture that is level and even, as we have already ſaid, whatever we would repreſent on another Picture that is not ſo. We divide the level Picture in ſeveral ſmall Squares; then make a frame of the ſame bigneſs, which we divide in equal ſquares with the help of ſeveral Threads. This frame we put in the place from whence the uneven Picture, whoſe parts are unequal, hath the appearance of the Picture which is ſmooth, and whoſe parts are equal. As here the Picture Y hath the appearance of the Picture X. This frame being prepared and placed, we put a Candle in the point A, where the Spectator is ſuppoſed to be placed. The ſhadow of the Threads of the frame X, will mark Figures on Y, to repreſent the Squares of X; ſo we muſt tranſport what is in each Square of X, into the cor-

correſpondent Figures of Y. The Figure is ſufficient to demonſtrate this Artifice.

For a clearer light into this matter, conſider the Figure repreſenting a proportioned head in the Square Z. If the Figure X were ſo ſituated, that from a certain point from whence it might be ſeen, it would have the appearance of the Square Z; then by obſerving what parts of Z correſpond to thoſe of X, and painting in theſe laſt, what is in thoſe of Z; that head in X, which at a near view, appears monſtrous, will, if ſeen from afar, appear proportioned, and every way, like that in Z.

We ought to follow the ſame method in painting Figures on a Concave place, which ſhould appear upright and perpendicular, as that of our Saviour fix'd to the Croſs. A Convexity or Concavity ſeen from afar, appears flat; ſo that to paint a Crucifix on that ſort of Surfaces, it muſt not be done in its natural proportion, but in ſuch, as if ſeen from afar, whatever be the figure or bigneſs of its parts, they may appear in their juſt proportion. Such Pictures are not made for a near view.

A Painter ought therefore to conſider which is the place, where a Convex or Concave Picture, hath the appearance of one ſmooth and even; it is in this place where he ought to put the frame. The light of the Candle placed

placed in the point which repreſents the Eye, will mark in the place that is Concave or Convex, the parts to which every part of the frame anſwers. So in Painting the ſame things according to the proportion that is betwixt the Squares of the Concave or Convex Picture, and the Squares of the frame, the appearance ought to be the ſame.

To do this ſort of Perſpectives after an eaſy Method, ſome pretend to prick all the features of the Model, and place it as the Picture is here, (ſee *Plate* 27.) for the light of the Flamboy A which paſſes through theſe little holes, will delineate all the features of this Perſpective. But let us conſider well, that the light which paſſes through theſe ſmall holes, as it ſpreads it weakens; ſo that it can never denote at a great diſtance the features of the Model that is prick'd, through which it paſſes.

Whatever Method is uſed, ſuch Perſpectives may be made to ſurprize thoſe that ſee them near and at a diſtance. If (*for inſtance*) we would paint St. *John* the Evangeliſt on a wall, with a green Habit and a blew Mantle; we may paint in the Perſpective, Meadows, Fields, Forreſts and Seas. If his Girdle be white, there we may paint Streams of Water; likewiſe Lakes in the place where his Goſpel is opened, and ſhews the Leaves white and extended. But all ſuch Figures as are different from the

natural

Plate. 27 Page. 138

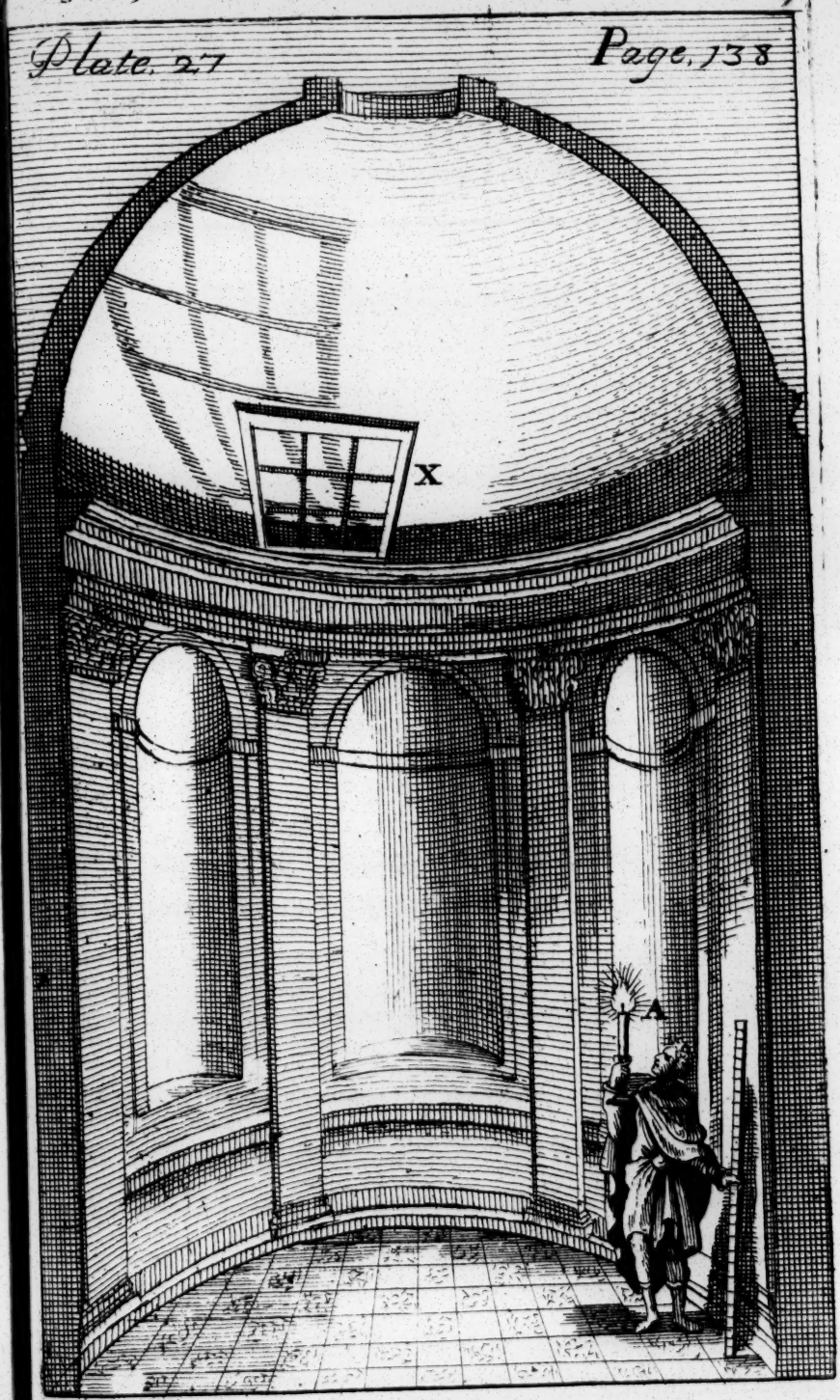


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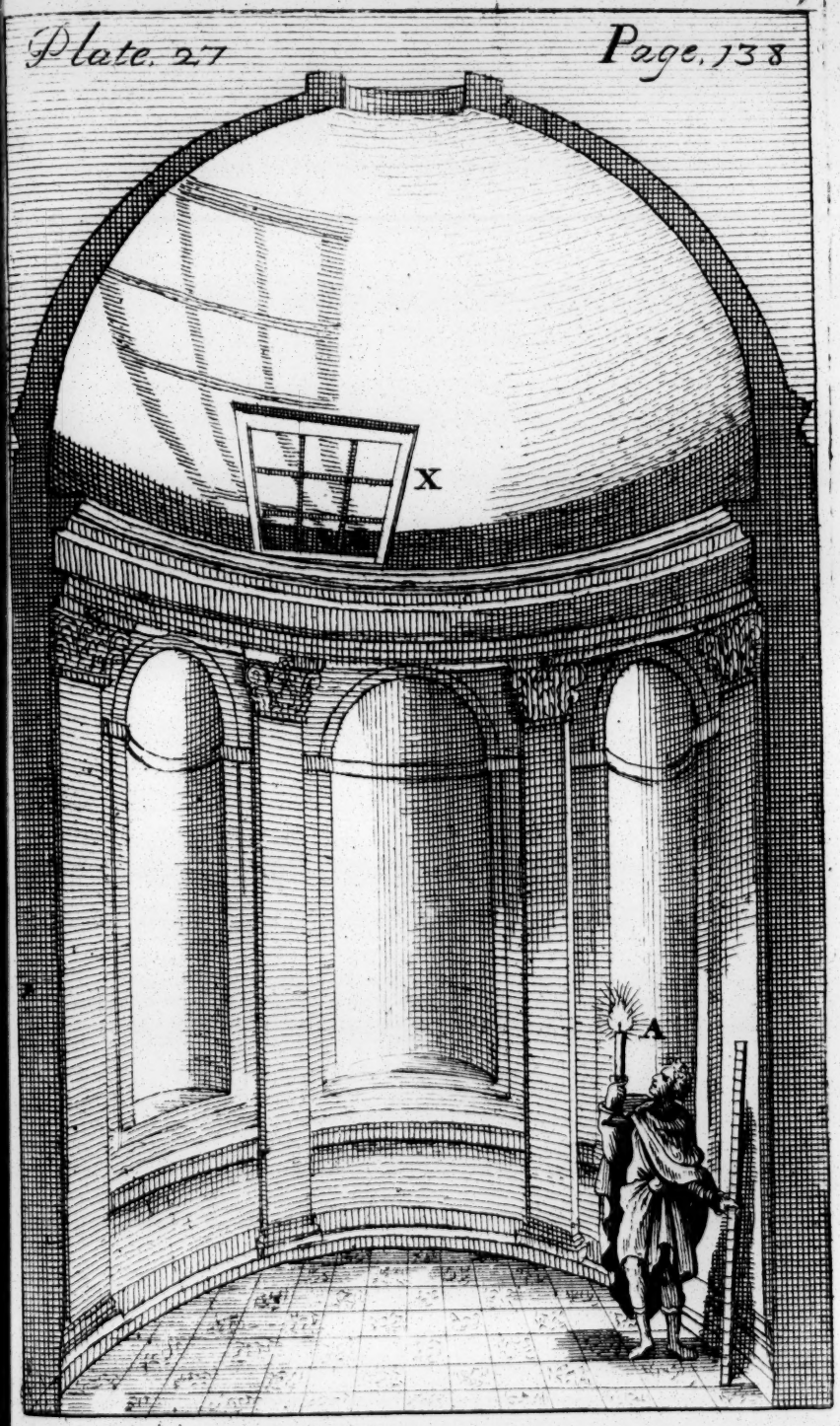
Plate. 27 Page. 138



natural Features of the principal Figure, muſt be ſo ſmall, that from the point from whence the Perſpective is to be ſeen, they have no appearance; and their colours muſt agree with thoſe of the principal Figure, and promote its beſt appearance. Much after the ſame manner we may repreſent in this Perſpective, ſmall Creatures, Fiſhers, Ships, Birds, and a thouſand other things, which at a diſtance will not appear, their Features loſing themſelves becauſe of their ſmallneſs, and their colours being confounded by that of the Habits of St. *John*, which is the ſame. Nevertheleſs all theſe little Figures, if ſeen near at hand, make the Perſpective ſo different from a St. *John*, that one would not think it could ever repreſent him, be it ſeen from what place it will.

I have already ſaid, that this ſort of Perſpectives ſhew beſt in a long Gallery. To render them more ſurpriſing, they are ſhewed through a hole at the door, to which is applied a Proſpective with two Glaſſes; ſo that tho' the Image of St. *John* be turned up-ſide down, this Image appears upright, which makes the Perſpective yet more confuſed, and St. *John* leſs eaſy to be known; for we can conceive nothing in its proper Features, nor can we perceive any relation to theſe ſmall Figures, which might have been made

made upright. This only happens when we ſee the Perſpective at a near view.

V.

Of Pictures and Statues made to be placed in high and eminent places.

After what we have ſaid, it will be needleſs to acquaint you again, that in Pictures which are upon flat and ſmooth grounds, but yet are placed much above the Eye, things ought not to be repreſented in their natural proportion; this muſt be underſtood of *Sculpture* as well as *Painting*. In ſuch a caſe, if we would have things appear what they are, we muſt paint them otherwiſe than they are. (*For inſtance,*) In making a Picture of our Saviour for a very high place, to the end that his Head may not appear too ſmall in reſpect to the reſt of his Body, it muſt be made greater. The higheſt parts which are ſeen under greateſt Angles, appearing ſmaller than they are, ought to have a more than natural ſize, to the end they may ſeem to be of a natural ſize. That is to ſay, in the Example propoſed, that the Head of Chriſt ought to be bigger, to bear proportion to the other parts of his Body, which being lower, and nearer the ſight, preſerve better the appearance of their true ſize.

Tzetzes

Tzetzes relates a Hiſtory which ſuits to our purpoſe: He ſays, that the *Athenians* having reſolved to place the Statue of *Minerva* on a high Column, gave orders to *Phidias* and *Alcamenes* to make each of them a Statue of this Goddeſs, deſigning to dedicate to her the fineſt of the two; *Alcamenes* made the Figure of *Minerva*, very fine, with an agreeable Viſage; there could be nothing finer, when ſeen near; every one went to his Work-houſe to ſee it with Admiration. *Phidias*, on the contrary, made her Figure quite otherwiſe; he placed her Lips in a wide diſtance, her Mouth open, and her Noſtrils large and great. Theſe great parts had no beautiful Aſpect in his Work-houſe, for which reaſon he was to be ſton'd by the People. But when the two Statues were put in their places, that of *Phidias* appeared with all the Beauty that could be deſired, and was much eſteemed by the *Athenians*: And that of *Alcomenes* loſt all its Grace, and appeared ugly and ridiculous. There is likewiſe a Rule, that in all large Gigantick Statues, no part ought to be made fine; it is enough that it appears as if it were hammered out; becauſe, beſides its being needleſs to make it otherwiſe, what is rough appears beſt at a diſtance, as being more palpable.

Painting

Painting and *Sculpture* have nature for their Object; they try to repreſent it; it ought therefore to appear in their Works what it really is. Nothing muſt appear too ſmall, or too great, in their Mixture. Thus a great Figure, which exceeds the natural ſize, does not well, unleſs it be ſo remote, as to appear in its natural magnitude. This was obſerved in the two fineſt Monuments now remaining of ancient *Rome*, namely, the *Trajan* and *Antonine* Columns. This laſt is 175 foot high, and that of *Trajan* is 140. The proportion of all the Figures of the Relieves that cover theſe Columns, anſwers to their ſituation; for their parts enlarge as they mount farther from the Eye; ſo that thoſe which are on the top of the Column, are as well ſeen, as thoſe which are below; and all is ſo equal, (as *M. Raguenet*, who has lately given us a Deſcription of theſe Monuments obſerves) that the Soul deceived by the Eyes, does not think of the difference of the ſituation of Objects, which muſt of conſequence ſink the difference of their Grandure.

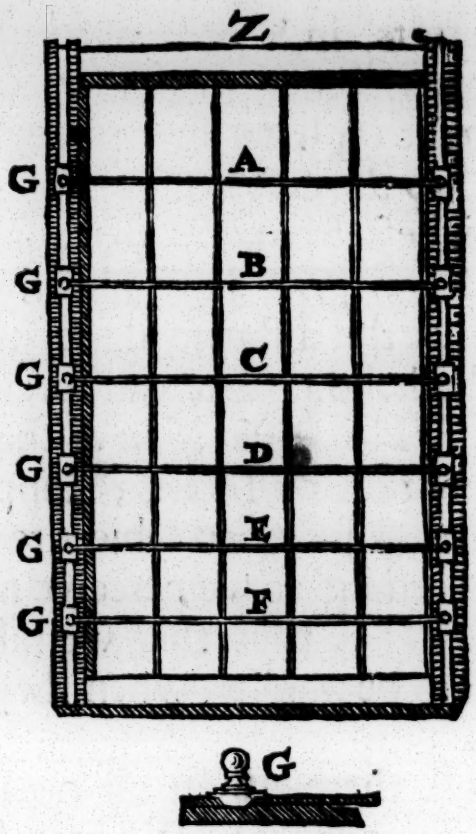
There is no certain Rule for judging what ought to be the grandure of a Statue placed in a high place, to the end it may appear in its natural ſize. Father *Tacquet*'s Rule agrees not with Experience; it does not ſatisfie the

Eye.

Eye. This is what obliges Painters, Carvers, and Architects, in Works of conſequence, to make Experiments to know what ſize a Statue ought to have in a place, where it is to be put, to the end it may appear in a reaſonable bigneſs from the place from whence it is to be ſeen. We have already obſerved, that it is not the diſtance alone, the remoteneſs, or the height, that can preſcribe a certain Rule. The Diſpoſition of the place, and the Interpoſition of bodies, ſupporting the ſight, makes us judge an Object to be greater or leſſer according as we perceive more things interpoſed. It is thus that we take the Sun and Moon to be ſmaller, when they are above our Heads.

We muſt therefore on all occaſions have reccurſe to Experience. We have ſhewn that this may be done by applying a Frame to the place appointed. I ſhall here add, That to know the true ſize that an Object ought to have in that place, to the end it may appear proportionable, the Lines or Rulers of this Frame which are parallel, ought to be moveable, like thoſe of the frame Z. Conſider one of theſe Rulers, the Figure G ſhews how they may move and remain parallel. This frame Z muſt be put in the ſame place where the Picture, Statue, or any other piece of Work is to be; Remove or approach the

Lines



Lines of this Frame, till they appear equally diſtant one from another; that is to ſay, till the Intervals A, B, C, D, E, F, appear equal. There is a neceſſity for their being ſo, and 'tis the real inequality of theſe Intervals, which ſhews how much we muſt augment the different parts of a Statue, according to the appearance we would have it make. It ſuffices ſometimes to place a courſe groſs body, in the place where the Statue is to ſtand, and to diminiſh and augment it till it appears in the natural ſize of what we would

have

have the Statue repreſent. Theſe Experiences are very neceſſary. The other Rules which are given, are falſe, becauſe they ſuppoſe that things ſeen under equal Angles, appear equal. I do not pretend to adviſe Painters what Subjects they ought to chuſe for their Pictures; but in ſpeaking of ſuch as are parallel to the Horizon, or inclined, and in general of all thoſe which have a ſituation uncommon, I cannot forbear ſaying, that they ought never to repreſent, but what is convenient for the place where the Picture is to be put. It is not proper to paint any thing in a Ceiling, but what may appear in the Air, and be above our Heads. So that it would be rediculous to paint Ships and Shipwracks in ſuch a place.

We muſt nevertheleſs acknowledge, that the beſt Painters have not obſerved this Rule: *Dominick Zampietri*, called commonly the *Dominican*, a Native of *Bologna* in *Italy*, painted in the Vault of the Church of *St. Andrew of the Valley*, a Picture of our Saviour, who from the edge of the Lake of *Geneſareth*, diſcovering *Simon* and *Andrew* in a Bark, calls them to him to be two of his Diſciples. This Painting appeared ſo excellent to *M. Raguenet*, that he allotted it the firſt place in his Deſcription of the Monuments of *Rome*.

I may be allowed to say, that *Helie* snatched away in a flying Chariot, the Rapture of St. *Paul*, or the Assumption of the Virgin *Mary*, would be more agreeable to a Vault: But in these Paintings, as in all others, the Pencil of a Painter does more than the Calculation of a Mathematician. The principal thing in it, is, That it depends upon a certain Posture, which makes (*for instance*) the Blessed Virgin, in her Assumption, mount in our view, that the more we behold the Chariot of *Helie*, the more we believe it really to fly.

The *Ganimedes* carried away by *Jupiter* in the form of an Eagle, designed by *Michael Angelo*, is much admired. *M. Raguenet*, in describing this piece, says, the Posture that this Famous Painter hath given to these two Figures, namely, the *Ganimede* and the *Eagle*, is wonderful; for the Bird so intangles him, with his Neck and one of his Talons, that he holds him with an invincible force, neither can he hinder him from taking his flight. One of his Talons alone, with which he surrounds the Leg of *Ganimedes*, and his Head and Neck with which he incompasses the Body of that young Man, commands him so much, that he has the motion of his Wings free to fly, without suffering his Prey to escape. I make these Remarks, to the end


B

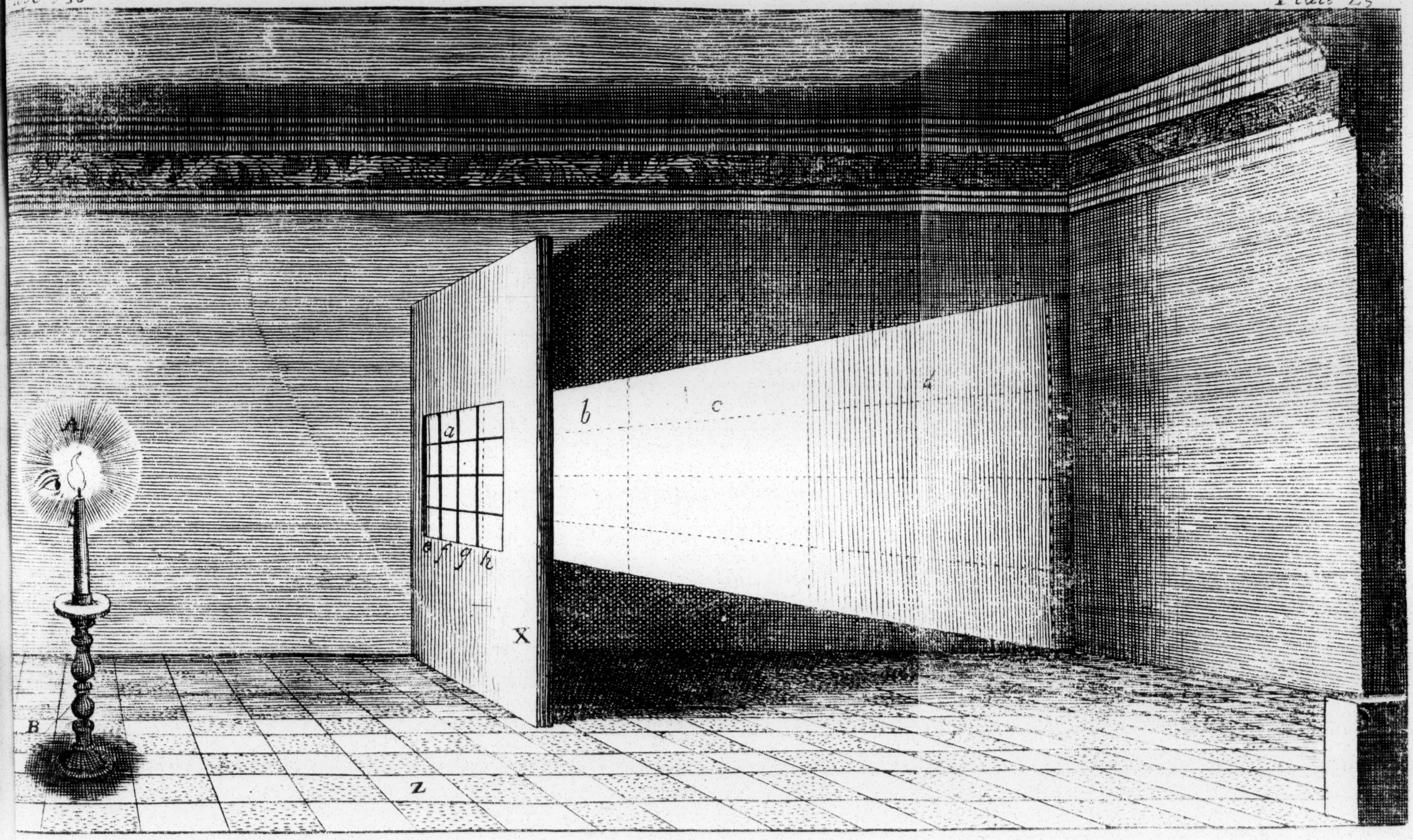

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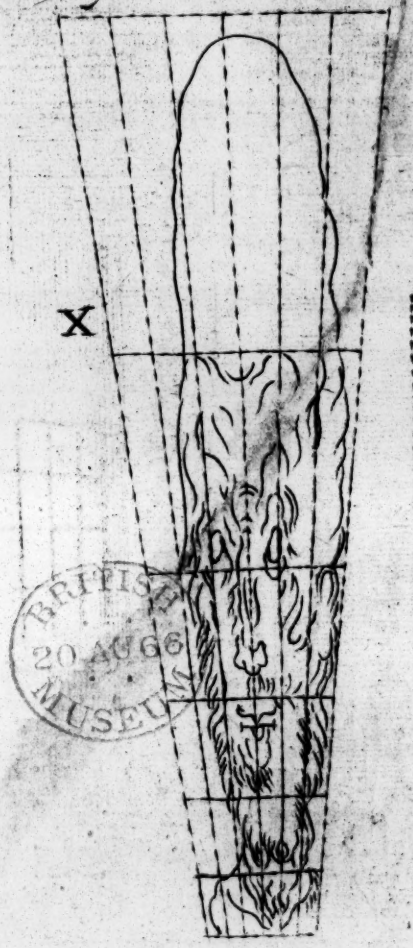
Plate 26



none may imagine, I pretend that a Mathematician, without being a Painter, can perform any thing in Perſpective.

We have ſaid, that nothing ought to be repreſented in a Ceiling, but what may reaſonably be imagined to be there. Yet if we paint there a *Cupola* with Niches, we may repreſent Figures, which may appear ſtanding. 'Tis in ſuch occaſions that Perſpective is wonderful. Amongſt the Monuments of *Rome* is reckoned, the Perſpective which the Father *Mathew Zacolino Theatin* made in the Vault of the Church of St. *Silveſtre a Monte Cavallo*. He has repreſented a Dome in the Quire of that Church with ſuch Art, that the moſt curious Eyes are deceived; neither can Reaſon correct the Error of the Eyes. It cannot be imagined, but that there is a Cavity in the Vault, at the place where this Dome is painted, and yet all is ſmooth and even. Near this Dome is ſeen a ſmall Angel painted in the Mould of an Arch, which commences the Vault of the Quire; and never did any picce of Painting appear ſo truly emboſſed as that is. This Angel ſeems to be clear of the Vault, not touching it but with his Head. *M. Raguenet* ſays, 'Tis impoſſible to carry Impoſture farther. The knowledge of the Rules we have given, was neceſſary to him that painted this Perſpective; But he is ſtill

Page 137

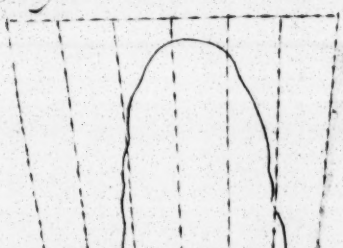


Plate 26

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more obliged to *Painting* than to the *Mathematicks.*

Before we finiſh this Article, let us ſay once more, that a rational Soul can never be ſatisfied with what is not likely. We cannot but be offended to ſee a weighty thing bear falſe; I ſay, a heavy thing; for if it had any levity, ſuch as the Air could ſupport, and the Winds carry, it might then be repreſented without any ſupport, in the Air, like Birds that have Wings. There is ſomething miraculous in the Rape of *Helie*, ſo that it is not offenſive to ſee her in a flying Chariot; but when a Man has not an extraordinary Talent, he ſhould not be allowed to repreſent any thing inclining, if he do not at the ſame time allow it a ſupport.

It is likewiſe a palpable fault, to place a Picture near the Eyes, when it cannot perform its effect but at a diſtance. Such are all the Pictures which have the ſituation, treated of in this Chapter. A Ceiling ſhould be lofty; a Concavity or a Convexity are not proper for Repreſentations, if they be not at a great diſtance from the Eye of the Spectator.

To conclude, I'll ſay freely, tho' I controul the Practice of moſt Painters, that their performance in Pictures to be placed much above the Eye, is not tolerable. They ſuppoſe the point of ſight above the ground line, and

and therefore they represent there all the Geometrical Plan. If they paint a Chamber, we see the Pavement: Now this can never be, for a Picture being as a Window, can we see a Horizontal Plan of an equal height with that Window, if this Window were much above the Eye. On such occasions a wise Painter should suppose his point of sight where it ought to be, above the ground line, and so neither suffer his Geometrical Plan, nor the feet of his Figures which are not on the ground line, or too near, to appear; unless we may suppose them to be in some high place, or on a Hill, that the Picture would suffer to appear if it were a Window, tho' the Spectator were in a low place.

CHAP. VIII.

Shewing that the moſt important Rules for laying on of Colours, proceed from Perſpective.

Painting, by the means of Light and Shadow, ſhews *Cavities* and *Eminencies* where all is flat. It can repreſent the Colour of every thing in particular, in all the degrees of Strength or Faintneſs, and according to the Changes which the Colours of neighbouring Bodies make on its proper colour. For diſtance doe, not only weaken and deface the Colours, but the oppoſition of thoſe that are near, alters and changes them. It is a different thing to ſee a Flower alone, and to ſee it in a Garden with others: This variety of Colours occaſions a new one, which unites all the reſt. So that when a *Painter* is not ingenious in repreſenting this union, all his Colours contradict and ſpoil each other. The diverſity of Colours, and how they enliven and weaken by infinite degrees, is a thing to be admired. An Arm of admirable whiteneſs, exactly the ſame in all its parts, is not equally white in reſpect to the Eyes of

of thoſe that ſee it, its whiteneſs differs according as it is expoſed to the light, as its parts are higher or lower, near or diſtant from the Eye, and 'tis by this we judge it to be round. Its whiteneſs cannot then be repreſented, but by the different degrees of whiteneſs which we give it in *Painting*. 'Tis not enough to ſhadow ſome parts of it, and to ſtrengthen theſe ſhadows, it ought ſtill to appear what it is, truly white: So that it is only by a ſeaſonable leſſening or augmenting its whiteneſs, that we make it appear round, without changing its colour.

Painters call an artificial Colour *Teint*; and *Semiteint* implies, the diverſe Colours as they are clearer or darker, more lively or more dull. 'Tis the Light and Darkneſs, the Black and the White, that cauſe the appearance of a *Relieve* or emboſs'd Work.

'Tis not my buſineſs to ſpeak of Colours; yet ſince the ſubject requires it, I ſhall copy what is ſaid by thoſe who have writ of *Painting*. Good Colour, ſay they, is that which hath the neareſt reſemblance to Nature; when the Objects painted have the ſame Colour, and the ſame Teint, as the Natural: When the *Carnations* (by which *Painters* mean the naked parts of a Figure) appear like true Fleſh, whether it be in the light

or ſhadow: When the Drapery reſembles Stuffs of Silk, Wool, or any other matter; and when theſe Colours keep their natural Luſtre, which is called Freſhneſs. Finally, Colouring well, is, when the Colours have nothing that is too ſtrong to fix and retain the ſight more in one place than another; or when there is not in the Work any one Colour too univerſally ſpread over the whole; when neither the Black nor the White, the Yellow nor the Red, nor any other Colour reigns, but an agreeable Variety of ſeveral Teints agreeing together, both in the Light and Shadow.

Painters do always ſuppoſe a principal Light falling on the middle of the *Picture*, where they place what is moſt remarkable; and as the Colour reflects all round, what is in the middle is moſt enlightned, and the reſt appears by reflection. All the Colours are confuſed at a diſtance; ſo that the Objects which are at the Extremity, ought to come near to the colour of the Sky, or of the ground of the Picture. *Painters*, under the name of *Aerial Perſpective*, comprehend the Science that is neceſſary to make Objects ſeem to ſhun or to approach us, by a ſucceſſive order of Teints. This belongs not to the *Mathematicks*; for Colours are different things from Lines and Features: Yet the Art which

which we have ſhewn, will be a great help for the more judicious application of Colours; and 'tis that which remains to be explain'd in this Treatiſe.

To grind and mix the Colours, is the buſineſs of a *Mechanick*. It belongs to an Artiſan to know the Effects of Blew and Red, and what may make thoſe Colours more lively or more dull, more clear or more obſcure. It is likewiſe the Experience which is got in working, that makes us obſerve the different Effects of Colours according to the ſituation they are in, and the Changes occaſioned by a great Light, or according as an Object is ſuppoſed to be expoſed to a greater Light. Theſe things I meddle not with. Yet a *Philoſopher* who knows perfectly the Nature of Colours, (which is yet a Secret) might give good Inſtructions to *Painters*; but this does not any way concern what I am to ſay here, concerning the Perfection of the Art I treat of.

That which concerns the Diminution of Lines in the Plan of the *Picture*, according as the Lines are repreſented diſtant or more near, is called *Lineal Perſpective*; and the Diminution of the Teints and Colours, as we have already ſaid, is called *Aerial Perſpective*. This laſt may be aſſiſted by the firſt; for what does a *Painter* in applying his Colours, does

does he not, in ſome manner, draw the Lines with his Pencil? Now he cannot do this exactly, if he does not draw theſe Lines according to the Rules which I have propoſed. To explain this,

There needs no great Art in repreſenting a Body which is flat and ſmooth, one colour is ſufficient; neither need we weaken or fortifie this colour in any of its parts, becauſe we ſuppoſe it entirely alike without any difference. It is not the ſame in *Relief* work. A Statue, tho' all made of the ſame Metal, and coloured with the ſame ſort of Colour, cannot be repreſented but by varying of its colour; for as all its parts are not turned after the ſame manner, and ſome advance or fall back, ſo they are not equally expoſed to the light; and conſequently there is a difference in their colour. Their being differently expoſed to the light, cauſes a change, and occaſions that amongſt its different parts, ſome have the ſame colour clearer than others. Theſe Alterations follow the different turnings or Features of the Objects. Therefore the Science of Shadows, or of what is called the Clear and the Obſcure, depends on *Lineal Perſpective*, which is only capable of finding theſe Lines by Art.

To

To conceive this more clearly, and to convince our ſelves of the uſefulneſs of *Perſpective* in applying of Colours, let us give attention to Experience, *viz.* That there is nothing but what may be imitated and repreſented with one Colour, with Ink, or with red or black Paſtil. We may give Life to a Deſign, only by drawing the Outlines. Now *Perſpective* is neceſſary in the drawing of thoſe Lines, which are as guides to the Pencil of a *Painter*, as we have ſaid.

Let us imagine a Statue made of Plans of an equal thickneſs, placed parallel the one above the other, ſo as if the Extremities of theſe Plans ſhould appear, the Statue would ſeem to be covered all over with parallel Lines or Strokes. Suppoſe this Statue is to be imitated or repreſented. It is certain, that if we find the Perſpectives of the parallel ſtrokes of this Figure, we ſhall make a perfect Image. It would be an infinite trouble if we were obliged to find all theſe ſtrokes by the Rules; but it may be done exactly enough, by the Eye, provided we obſerve what hath been demonſtrated, that what is parallel in the Object, is not always ſo in the Repreſentation; and that except what is level with the Eye, and exactly oppoſite

oppoſite to it, nothing continues parallel; that ſo thoſe of the parallel Strokes or Lines, which are above the Eye, in the parts which are moſt diſtant, ſeem to deſcend; and that on the contrary, the ſtrokes ſeem to mount in thoſe which are below the Eye, and at a diſtance, (ſee *Plate* 28.) This may be obſerved in the Statue Z, which I ſuppoſe made of parallel Plans, as I have ſaid, tho' they could not be all mark'd: Excepting the Plan which is exactly oppoſite, and level with the Eye A, the extremities of the others mount or deſcend according as they are higher or lower than the Eye A, We ſee likewiſe the effects of the *Opticks* in the two Globes B and C, whoſe ſtrokes are differently turned, becauſe thoſe of the Globe C, ſeen from high to low, ought not to have the ſame appearance as thoſe of the Globe B, which is ſeen from below to above by the Eye A. This Figure expreſſes my meaning but very imperfectly; but a ſmall attention will eaſily ſupply what neither my words nor the *Engravers* Art could explain. We may eaſily conjecture what ought to be the appearance of theſe parallel ſtrokes of this Statue. Now Experience ſhews, that nothing can be more capable of giving Life to a *Picture*, than an exact obſervance of theſe

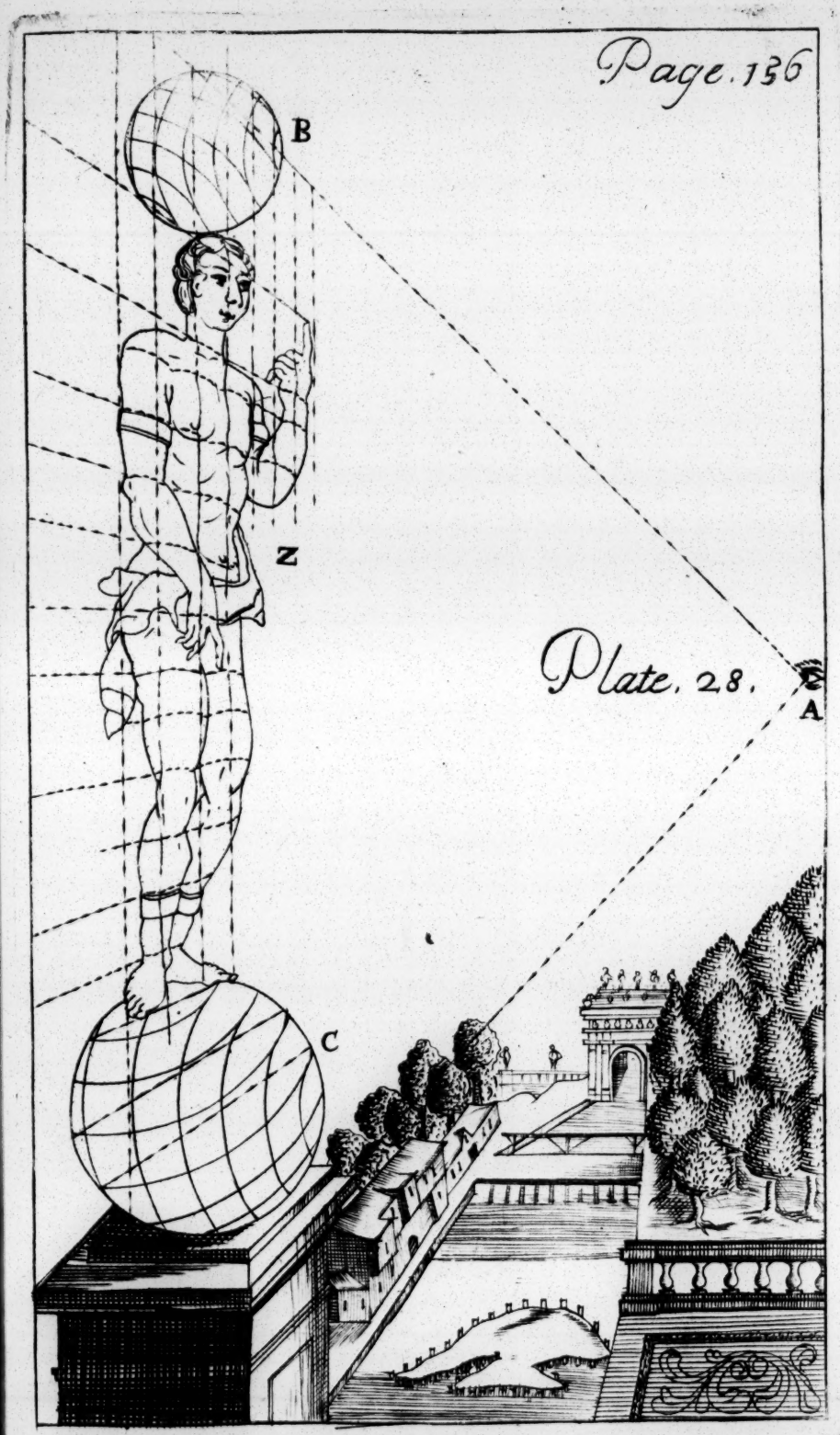

Plate. 28.

theſe Lines. This Experience we have in the Prints where *Engravers* repreſent threads of Drapery; all theſe threads are parallel amongſt themſelves in their ordinary Diſpoſition, when the ſtuff is extended in the Loom; but ths Paralleliſm changes, and each line turns after they are cut, or made in a Habit; and that the Stuff is differently folded. When *Engravers* know how to imitate this Deſcription, when they expreſs the turnings of thoſe threads as *Perſpective* requires; then the Image of what they repreſent, hath a roundneſs equal to that of the beſt *Pictures*; for it is not the Colours alone that makes the Relief, but the Strokes of the Pencil, when they are done by the Rules of *Perſpective*.

We may likewiſe ſuppoſe the Statue Z to be made of Plans placed parallel but vertically; that is to ſay, that this Statue is made ſo, that the Plans of which it is compoſed are vertical. It muſt be covered with Lines which we may imagine in all ſorts of Objects. Theſe Lines will be imaginary; but there are ſome that are real, which determine the out-ſtrokes of an Object; and theſe are the Lines which a *Painter* ought to follow, and by which he ought to

to regulate his Teint : It is impoſſible to mention every thing we ought to obſerve. In Repreſentations of *Architecture*, each Stroke or Feature ought to be ſuitable to the things; ſo to repreſent a thing that is perpendicular, the Lines which make the Shadows ſhould croſs each other perpendicularly. If we ſuppoſe an *Architecture* covered with Lines, we muſt of neceſſity ſuppoſe a great number, which determine the parts of this *Architecture*, and mark out its meaſures. If I ſay, we ſuppoſe an *Architecture* compoſed of Lines, theſe Lines muſt be repreſented as is taught by *Perſpective*; that is to ſay, as they ought to appear. Thoſe which are the *Perſpectives* of Lines parallel to the *Picture*, ought to continue parallel to each other; thoſe which are perpendicular to it, ſhould loſe and confuſe themſelves in the principal Point.

What I have ſaid is ſufficient: There remains nothing more to be done before I finiſh this Treatiſe, but to ſpeak of the Shadows. I ſhall ſay no more of Colours that are ſhadowed, that is to ſay, of thoſe which are made fainter, or more obſcure, according as the Object they repreſent is more

more diſtant, or leſs expoſed to the Light: My Intention is, to ſpeak of Shadows caſt upon adjacent Bodies, by that which robs them of the Light, they being placed behind it.

CHAP.

CHAP. IX.

A General Obſervation on the Proportion of Shadows.

THIS Subject might be enlarged upon, but 'tis ſufficient to take notice of what we may remark every day, that when the *Luminous* and *Opaque* Bodies are of an equal bigneſs, the Shadow made by the *Opaque* Body, ought to be contained between two parallel Lines; that if the *Luminous* Body be the leſſer, the Shadow grows and augments infinitely; and on the contrary, if the *Opaque* Body be the leſſer, the Shadow diminiſheth, and terminates in a Point.

This is the Rule for the Magnitude of Shadows; their Figures are different, according to the difference of the *Opaque* Bodies that occaſion them. Experience ſhews the effect of the Light, when a Body is expoſed to it; and what happens to that Body, when it is deprived of it by another. All this is eaſily comprehended: Yet becauſe I would leave nothing to conjecture, I have made theſe following Figures; X repreſents a *Luminous* Body, and Z a *dark Globe* leſs than

Plate 29

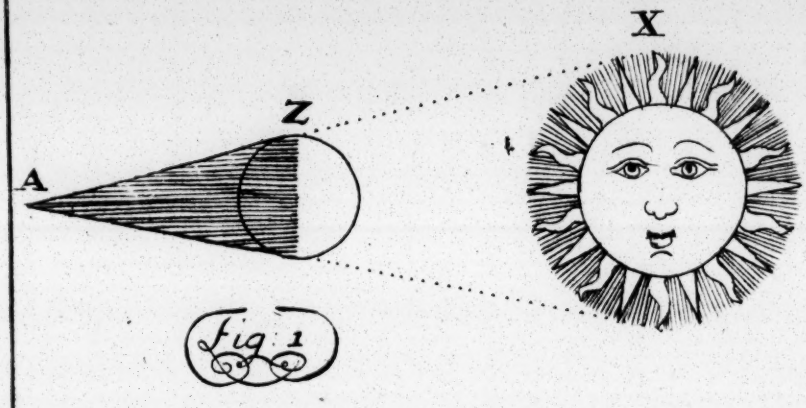

Fig: 1

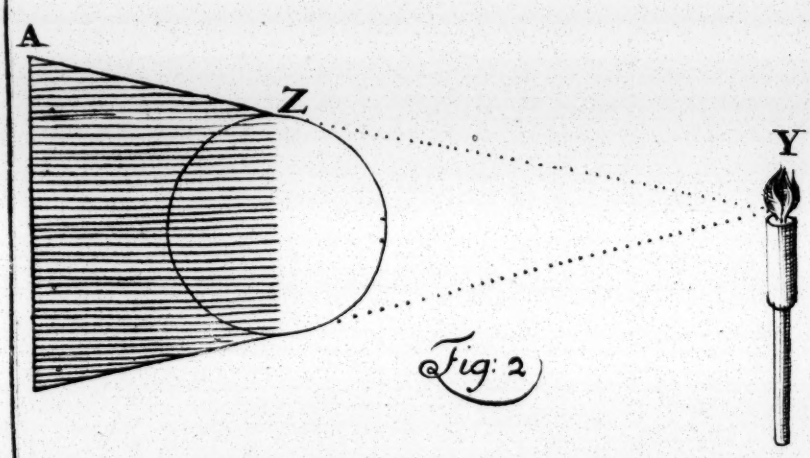

Fig: 2

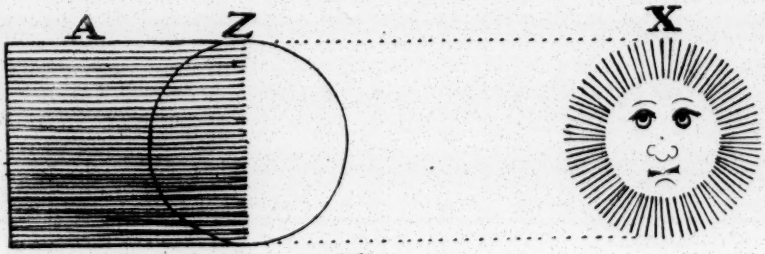

Fig: 3

than the *Luminous* Body (ſee *Plate* 29. *Fig.* 1.) it is evident that the ſhadow of X ought to terminate at a Point, and form a Cone, whoſe top or point is A.

If the *Opaque* Globe Z were equal to the *Luminous* Body X, the ſhadow A of the *Opaque* Body Z, would be contain'd between two parallels, (ſee *Plate* 29. *Fig.* 3.)

When the *Luminous* Body Y is leſs than the *Opaque* Body Z, the contrary ought to happen from what we have obſerved, when the *Opaque* Body is the ſmalleſt; to wit, that its ſhadow diminiſhes; for here the ſhadow A grows larger, (ſee *Plate* 29. *Fig.* 2.)

'Tis likewiſe to be obſerved, that the ſhadow is longer or ſhorter as the Luminous Body is more or leſs elevated. In the Morning when the Sun begins to appear on the *Horizon*; or in the Evening, when he is going down, the Shadows are infinite, as he elevates, they grow ſhorter: At Noon, when he is above our heads, if he were directly ſo, we ſhould have no ſhadows; but this happens only to ſuch as are under the *Torrid Zone*. What ſhadow he makes in our Climate, is always ſhorteſt at that hour. For the clearer Conception of this, ſee *Plate* 30. *Fig.* 1. where X repreſents the Sun, and Y and Z two *Opaque* Bodies of *Cubical* Figures,

as Gaming Dice: As the Sun is more elevated in regard to Z, ſo its ſhadow A is ſhorter than the ſhadow B of the body Y, in regard to which, the Sun hath a leſs Elevation.

Shadow is a privation of Light; ſo that when an *Opaque* body hinders the Communication, there muſt be a ſhadow. All Windows may be conſidered as *Luminous* bodies; ſo Objects which cannot be enlightned becauſe of the Interpoſition of ſome *Opaque* body, appear obſcureſt. There are different degrees in ſhadows, they may be ſtronger or fainter; for as the light may come from ſeveral places, the ſame Object may have the benefit of one light, and be deprived of another. If it receives no light at all, then it muſt be covered with a thicker ſhadow.

The light is ſometimes reflected; and there are bodies which do not receive it directly, and conſequently ought not to appear in a lively Brightneſs; but at the ſame time they are not quite obſcure, becauſe in the ſituation in which they are, the Light is reflected upon them from the neighbouring bodies. *Painters* make a diſtinction betwixt a *Principal* Light, and what is called a *Reflected Light*. They chuſe their Light as they pleaſe: They ought to be careful in the obſervance of their

Syſtem;

Plate 30

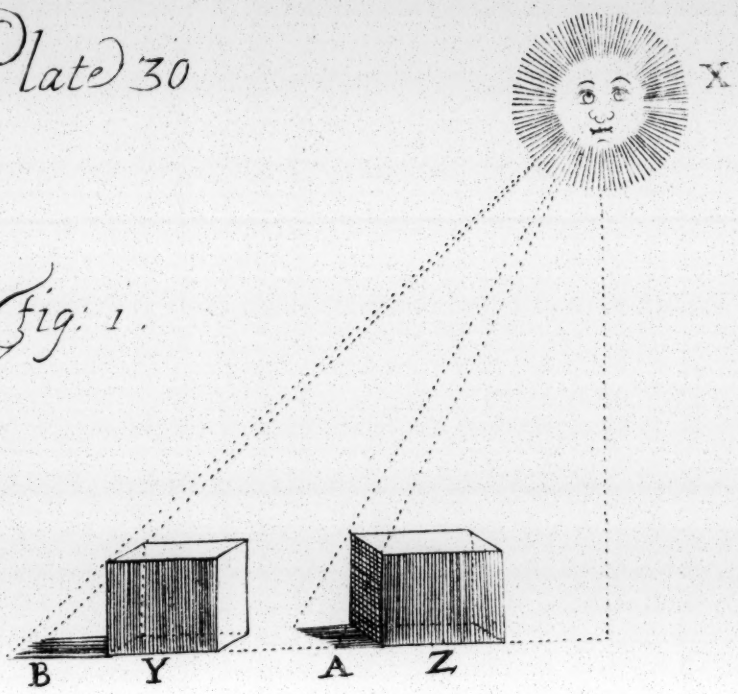

Fig: 1.

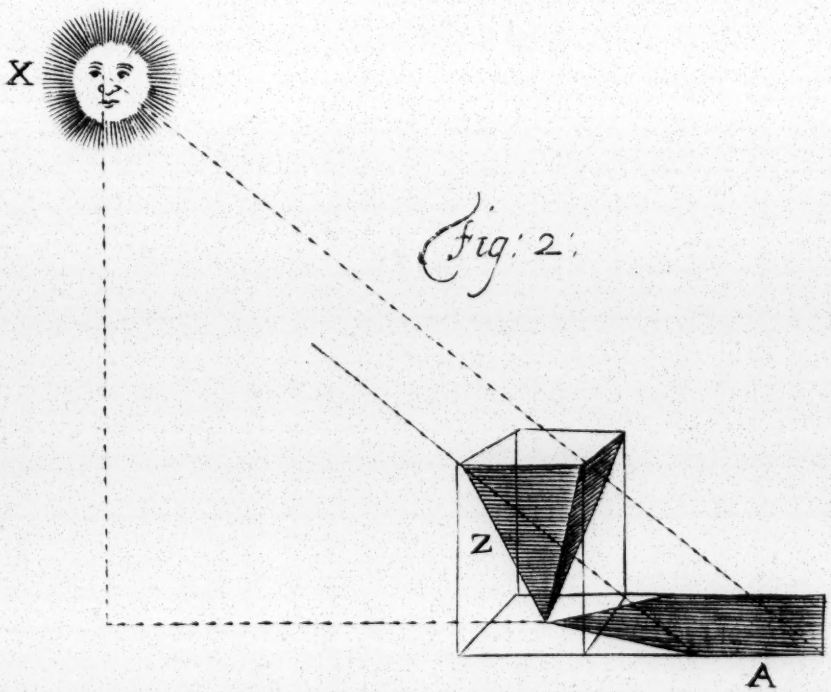

Fig: 2.

Syſtem; that is to ſay, that having once choſe the place from whence they ſuppoſe the Light to come, every thing ought to agree to their Hypotheſis. For in fine, every thing ought to be likely in a *Picture*; and Contradiction deſtroys Likelyhood. 'Tis not likely that a body covered with Shadows, ſhould be expoſed to a Light, which is not kept from it by the Interpoſition of ſome other body.

That we may not be deceived in Shadows, let us conſider the Works of Nature; that is to ſay, that having once conceived, and fully concluded upon the deſign of the Work we project, to the end we may ſucceed in it, we may make a Model of it on a Table, repreſenting the Geometrical Plan, and obſerve nicely the Shadow of each body which we are to repreſent. We muſt likewiſe conſider the Figure of this ſhadow. It would be an infinite labour to be obliged to determine what may be the Projection of the Shadow of each body, according to its different Figures or Poſtures. We might make intire Volumes upon that Head, and there ſet forth all the Science of *Geometry*. A ſmall attention to what we ſee, or to eaſy Experiments, will ſoon inſtruct a *Painter* in what

is neceſſary to be known. The Sun X lights the reverſed Pyramid Z, its ſhadow is A; and both Reaſon and Experience ſhew, that it muſt have that ſhape.

There are ſome *Painters*, who, to be aſſured of the Effects of a Shadow, place a Lamp in the place from whence they ſuppoſe the Light to come. This without queſtion is ſufficient to ſhew the ſhapes of the Shadows; and the Experiment is very good, to mark all the Effects of the Shadows that are moſt ſenſible; for with a full day-light there are ſo many lights which reflect over all the Air, that there is no perfect ſhadow; I mean, that is very black. It is not ſo in the night-time, when there is no light but what comes from one or more Lamps. Conſider then the Pyramid O, that it is lighted by two Lamps P and Q; and that it hides the light from the parts behind it. We have endeavoured to deſcribe all the Effects of theſe two Lamps, to the end that upon occaſion, nothing may eſcape the Diligence of a *Painter*, and that he may obſerve where the Shadows of *Opaque* bodies ſhould be, (ſee *Plate* 31.)

But

Plate 31

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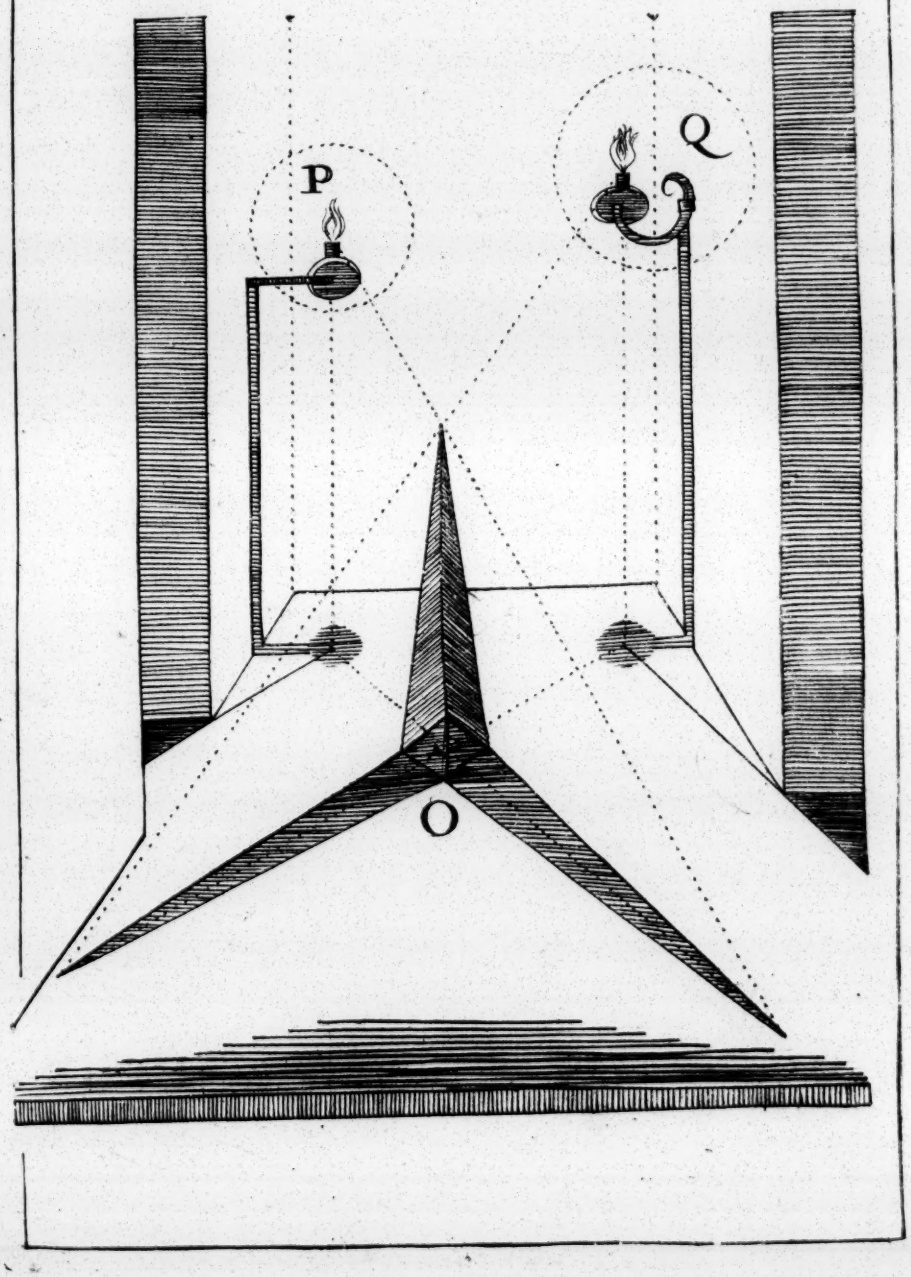

But after all, there is a great difference between the Effect of a Lamp, and that of the Sun: Colours ſeen by an *Artificial* Light, appear very different from what they are, when ſeen in full day-light. The Light which is ſpread over all the Air when the Sun ſhines, and ſurrounds the bodies, lights them on all ſides, which a Lamp cannot do: Therefore it is only good for repreſenting the time which we then uſe; that is to ſay, a night enlightened by Art, while the Natural Light is abſent.

'Tis needleſs for me to ſtay longer on this Subject, or to be particular upon all the different ſhapes of Shadows, with reſpect to the bodies that occaſion them, and to the *Luminous* bodies of which they hinder the Effects. That is eaſy; therefore I ſhall only ſay, that after having well obſerved the Figure, and the Meaſure of the Shadows of Objects on the Geometrical Plan; we muſt find the *Perſpective* of this Figure, and the *Perſpective* bigneſs of that meaſure.

This is the true way of working exactly; but *Painters* are not at ſo great pains, their work will not allow it; they are forced to make ſeveral Pictures in a Year for an honeſt

Livelyhood. The Illuſtrious *Painters* in ancient times, imployed whole Years in making one *Picture*: What did I ſay, in making? They were whole Years in forming the Deſign; which coſts the leaſt trouble to moſt *Painters* now. The moſt Laborious and the moſt Exact, deſign by the Eye what they would imitate: So that we ſeldom ſee Pieces worthy of Admiration.

This Treatiſe of *Perſpective* cannot be acceptable, but to ſuch *Painters* as aim at Perfection: Thoſe of the Indifferent ſort, look upon it as uſeleſs, becauſe they are ſenſible of their own Weakneſs in making uſe of it: I hope ſuch as are in a Condition to examine it, will judge otherways. Beſides, I pretend not that every *Picture* ought to be an exact *Perſpective*; or that none can be fine, if the Objects there repreſented, and which we ſuppoſe would be ſeen, if it were tranſparent, appear not in their natural bigneſs, and in their true diſtance. This is to be wiſhed: Yet I acknowledge there are ſome very fine *Pictures*, that have not theſe Advantages: But we cannot from thence conclude, that *Perſpective* is only good for painting the Schens of a *Theater*,

Theater, or ſome *Architecture* in the farther end of a Gallery.

A *Picture*, I ſay, may be Excellent, tho' it have not the Effect of an exact *Perſpective*; which is impoſſible, when the Figures are all much ſmaller than the Natural, and ſo cannot make the ſame Impreſſions as the things themſelves which we repreſent. In fine, *Painting* cannot pleaſe if it be not reaſonable: And this it cannot be, if the Imitation be not perfect; that is to ſay, if it do not imitate the truth. We are ſenſible, that what is acted on a *Theater*, is but a Fiction; the *Theater* is too ſmall; all is there too much contracted, both the time and the place, to conceal its being only a Repreſentation; but tho' the truth be wanting, we find the Likelyhood, without which, the piece would appear ridiculous. Every thing muſt likewiſe, in a *Picture*, have the reſemblance of truth. Having therefore ſuppoſed the Action which is to be repreſented, to be ſeen from a certain Point, 'tis to that Point that all ought to be directed. A *Picture* may be great or ſmall. We may ſuppoſe Objects ſuch as we would have them; but there muſt be a point of ſight, to which all tends;

and we cannot draw one ſtroke of a Pencil, without having a regard to this Point; which is impoſſible to be done without *Perſpective*; and this proves *Perſpective* to be the Foundation of *Painting*.

CHAP.

CHAP. X.

A Conference of Socrates *with* Parrhaſus *the famous Painter, and with* Cliton *the ingenious Carver.*

Taken out of the third Book of Zenophon, *concerning memorable things relating to him.*

I Have often in this Treatiſe, foreſeen that I may be blam'd, for daring to ſpeak of *Painting*, which I am ignorant of. It is not fit to meddle with what we do not know. I own I can neither Deſign nor Paint; How ſhall I then juſtifie my Conduct? I have ſaid, I ſpeak only of the means of finding the *Perſpective* of the Points and Lines which terminate and meaſure the Dimenſions of a Body propoſed to be put in *Perſpective*, which belongs to *Geometry*. But, ſay they, you go beyond the extent of *Perſpective*, in meddling to give your Sentiment of *Painting* in general. I muſt give a reaſon for this, and to that end ſhall relate a Conference between *Socrates* and two famous

famous Workmen, one of which was a *Painter*, and the other a *Carver*; which will be ſufficient to demonſtrate, that we may contribute to the Perfection of Arts, without being Mechanicks.

Zenophon, in his third Book of the memorable things of *Socrates*, relates a Conference that *Socrates* had with *Parrhaſus* the excellent *Painter*, and with *Cliton* the ingenious *Carver*. The Philoſopher inſtructs them in what might render their Works more perfect: This he does after his ordinary manner, interrogating them in ſuch order, that in their anſwers they ſpeak as if they knew before-hand what he asked them, and what they wanted to be inſtructed in. They eaſily acknowledge the truths he diſcovers. This was his method in all the Inſtructions he gave, it being admirably well calculated for Inſtruction. This Conference was long ago tranſlated into *French* from the *Greek*, by an eminent Collegiate. And it is thus: *Zenophon* ſpeaking of *Socrates*.

" He was admirable in all Converſation,
" and if he met even with a Mechanick,
" he ſpoke always ſomething that might be
" ſerviceable to him.

" Being once in the Work-houſe of *Par-*
" *rhaſus* the Painter, he conferr'd with him
" after

" after this manner. Is not *Painting* a Re-
" preſentation of all that we ſee? For with
" a little Colour, you repreſent on Cloath,
" Mountains and Caves, Light and Obſcu-
" rity: You make a difference between
" what is hard, and what is ſoft; between
" what is ſmooth, and what is rugged:
" You give to Bodies Youth and Old Age;
" and when you would repreſent a perfect
" Beauty, ſuch as is impoſſible to be found,
" without ſome fault or other; you uſe
" to conſider a great many; and taking
" from each what pleaſes you, you make one
" every way accompliſh'd.

" You are in the right, anſwered *Par-
" rhaſius.*

" Can you repreſent, ſaid *Socrates*, what
" is yet more Charming, and more ami-
" able in a Perſon, I mean the Inclina-
" tion?

" How would you, anſwered *Parrhaſius*,
" that I ſhould paint what cannot be ex-
" preſs'd by any Proportion, nor with any
" Colour, and what hath nothing common
" with all thoſe things you have named,
" which are imitable by the Pencil; in a
" word, what cannot be ſeen?

" Do not Men, replied *Socrates*, make
" Hatred and Friendſhip appear in their
" Countenances?

" Yes,

" Yes, I think ſo, ſaid *Parrhaſus.*

" Then it is poſſible to obſerve Hatred or " Friendſhip in the Eyes?

" I acknowledge?

" Do you likewiſe believe, purſued *So-* " *crates*, that in the Adverſity and Proſpe- " rity of Friends, thoſe who are intereſted " keep the ſame Countenance as thoſe who " are not concern'd?

" No ways, ſaid he, for in the time " of our Friends Proſperity, our Viſage is " Gay, and full of Joy; whereas in their " Adverſity, we are Dull and Melancholly.

" This then can be likewiſe painted.

" 'Tis certain.

" Farther, ſaid *Socrates*, Magnificence, " Generoſity, Baſeneſs, Cowardice, Mo- " deſty, Prudence, Inſolence, and Ruſti- " city; all theſe appear in the Viſage or " in the Poſture of a Man, whither ſitting or " ſtanding.

" You ſay right.

" Then this can be imitated by the Pencil?

" It may.

" And whither find you greater Pleaſure, " ſaid *Socrates*, in ſeeing the Portrait of a " Man, who by his Looks diſplays a good " Temper, and good Manners, or of one " who carries the marks of a Vicious Incli- " nation in his Viſage?

" There

" There is no Compariſon there, ſaid
" *Parrhaſius.*

" Another time diſcourſing with *Cliton*
" the *Carver*, I am no ways aſtoniſhed, ſaid
" he, at your putting ſo great a difference
" betwixt the Statue of a Champion that
" runs away, and that of one who ſtands
" his ground and faces his Enemy, in order
" either to Wreſtle, to fight with the Dag-
" ger, or to exerciſe at all ſorts of Fencing.
" But what Surpriſes the beholders, is, that
" your Statues ſeem to have Life: I would
" fain know by what Art you inſpire them
" with this admirable Vivacity? *Cliton* being
" ſurpriſed at this Queſtion, and not anſwer-
" ing quickly, *Socrates* went on as follows;
" Perhaps you take great care to make them
" like Perſons that are living; and this is the
" reaſon that they ſeem to be likewiſe alive.

" 'Tis ſo, ſaid *Clitou.*

" Certainly then, replied *Socrates*, you
" muſt obſerve very exactly amongſt the dif-
" ferent Poſtures of Bodies, which are the
" moſt natural Diſpoſitions of all the parts;
" for when ſome bow down, others are lifted
" up; when ſome are preſſed, others are ex-
" tended; when ſome are ſtrongly bound,
" others are relaxed; and in imitating all this,
" you make your Statues approach very near
" to Nature.

" 'Tis

" 'Tis true, ſaid *Cliton.*

" Is it not likewiſe true, continues *So-*
" *crates*, that 'tis a great Satisfaction to the
" Spectators, when all the Paſſions of a Man
" in Action, are well expreſſed? So in the
" Statue of a Champion fighting, that furi-
" ous look with which he threatens his
" Enemy, muſt be imitated; and on the
" contrary, to a Victorious Champion muſt
" be given a gay and contented Countenance.

" 'Tis not to be doubted.

" Then, ſaid *Socrates*, an excellent Sta-
" tuary muſt repreſent the Actions of the
" Soul, by the Motions of the Body.

Such like Conferences, might, without doubt, be very uſeful to Mechanicks. *Socrates* was neither *Painter* nor *Carver*; yet we may ſay, he contributed by ſuch Inſtructions, to carry both *Painting* and *Carving* to that diſtinguiſhing degree of Perfection, that theſe two Arts were arriv'd at in his time.

F I N I S.